U.S. Government

RESEARCH & DEVELOPMENT REPORTS

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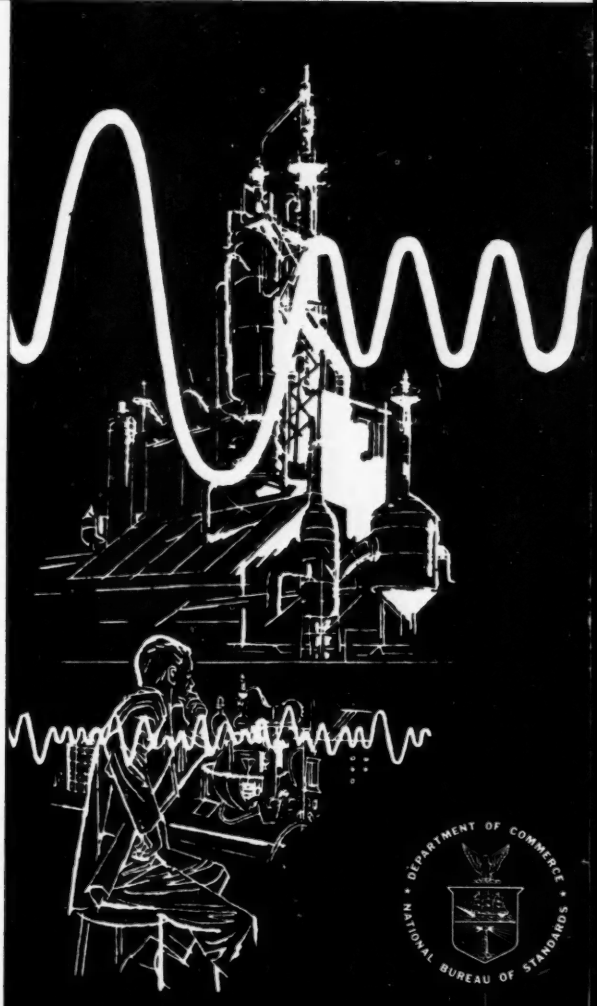

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(Formerly Office of Technical Services)

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

Issued twice a month by the Clearinghouse for Federal Scientific and Technical Information (formerly Office of Technical Services). Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Address changes should be sent to Superintendent of Documents.

PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by report/accession number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes.

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting report/accession numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by report/accession number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Bernard M. Fry, *Director*

Contents may be reprinted freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

special ANNOUNCEMENTS

A SINGLE INDEX FOR NEW FEDERAL R&D

A Clearinghouse publication beginning March 1965 will provide scientists, engineers and research managers with a single index to new unclassified Government-sponsored technical information.

Entitled Government-Wide Index to Federal Research and Development Reports, it will be made up from machinable index records of four major Government announcement journals prepared by the Atomic Energy Commission, National Aeronautics and Space Administration, Department of Defense, and the Clearinghouse.

Journals To Be Indexed

The agency announcement journals to be covered by the Government-Wide Index are:

Nuclear Science Abstracts (AEC)

Scientific and Technical Aerospace Reports (NASA)

Technical Abstract Bulletin (Defense Documentation Center)

U.S. Government Research and Development Reports (Clearinghouse)

Appearing the 15th of each month, the Government-Wide Index will list the reports announced during the previous month. The first issue will bring the series up to date by covering January and February 1965.

Computer-Merged

For this project, the Clearinghouse is initially using the computer facilities of the Aerospace Research Applications Center at the University of Indiana. The journal records, in the form of punched paper tapes, magnetic tapes, and cards, are fed into the computer which merges them into a single index under the four standard access points of subject, author, source and report number.

How to Order

The Government-Wide Index to Federal Research and Development Reports will be printed and sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Price is $10 for a one-year subscription (12 issues); add $2.50 for foreign mailing; single issue, $1.25. Make remittance payable to Superintendent of Documents.

NASA TECH BRIEFS AVAILABLE FROM CLEARINGHOUSE

Tech Briefs prepared by the National Aeronautics and Space Administration to acquaint industry with the technical content of innovations growing out of the space program research may be purchased from the Clearinghouse.

Each one- or two-page illustrated Tech Brief describes items selected from NASA's advanced technology that may be of particular interest to commercial and other non-aerospace applications. Items selected for Tech Briefs include products or devices, manufacturing processes and techniques, and materials.

The NASA Tech Briefs will be distributed monthly and may be purchased on an annual subscription basis in five categories. Subscriptions are available to all categories for $20 a year. The briefs are also available at 15 cents each. Tech Brief subscriptions are on a calendar year basis beginning in January. Prices for individual category subscriptions are:

Electrical-Electronic	$6.00
Energy Sources	2.50
Materials	5.00
Life Sciences	2.50
Mechanical	6.00

All Tech Briefs issued in 1964 (221 total in all categories) are available at a special price of $10 from the Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151.

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FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. Government agencies and provides reference, interlibrary loan, and reproduction services.

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of California
General Library
Berkeley, Calif. 94704

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research and Development Reports (formerly U. S. Government Research Reports) are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

RESEARCH HIGHLIGHTS

REPORTS OF CURRENT HIGH INDUSTRIAL INTEREST

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BIOLOGICAL & MEDICAL SCIENCES

FOREIGN DRUG NAMES

A handbook compiled from foreign literature sources indexes the trade names, chemical names, and common names of drugs, chemotherapeutic compounds, and other pharmacologic agents. The index, containing 307 numbered drugs, is divided into chapters according to the drugs' principal pharmacologic action. Whenever possible, the drugs are listed under the trade or chemical name most commonly used in this country. Compilers note that the handbook will make it easier to reproduce experiments from foreign literature (and domestic literature where foreign drug names are used) by dispelling any doubt as to the exact compound being used. It should also do away with work delay caused by searches for proper identification of the drugs' names. Order AD-609 908; HC $3.00, M/F 75 cents; INDEX OF TRADE, CHEMICAL AND COMMON NAMES OF FOREIGN DRUGS AND OTHER PHARMACOLOGIC AGENTS. (This report cited in this issue, see page 54.)

COMMUNICATIONS

CROSSBAR SWITCHING DEVICE FOR TELETYPE

A novel switching device eliminates tape editing and reduces the average time required for completion of message transmission over a communication relay operation. When the outgoing line is busy, arriving messages are stored in a common bank of reperforators and read over the line later. Previous to the development of this device, the operator periodically tore off the tapes from each source, divided the tape into messages for the various destinations, and then read them over the corresponding send lines. This torn-tape method has several disadvantages: a message is never relayed over its intended send line immediately, even if the send line is free when the message arrives; secondly, the tapes require editing, the operator processing the output of one reperforator at a time so that messages are not necessarily sent out in the same chronological order in which they arrived. In the system for which the switching device was designed, 15 teletype receiving circuits are connected to it as inputs, with the communications circuit and 6 reperforators connected as outputs of descending priority. Order AD-609 990; HC $2.00, M/F 50 cents; A TELETYPE COMMUNICATIONS AUTOMATIC SWITCHING SYSTEM. (This report cited in this issue, see page 26.)

CONTROL SYSTEMS & INSTRUMENTATION

HIGHLY ACCURATE SHIP SPEEDOMETER

A newly-developed system for measuring the speed of ships has an accuracy of 99 percent over a range of 3 to 30 knots. Developed by the Navy's David Taylor Model Basin, this Mark I Knotmeter can be launched and retrieved at speeds up to 6 knots. The system consists of a cable-towed body, associated instruments, and handling equipment. When towed at 30 knots, the body reaches a depth of 60 feet and the safety factor of the tow cable is two. A transducer in the towed body senses the rotation of an impeller and sends a signal through the tow cable for display on a digital indicator. The Model Basin's report on the system explains the Knotmeter's hydrodynamic design, components, calibration procedure, and the predicted forces and configurations of the cable-body assembly at sea. Order AD-610 073; HC $2.00, M/F 50 cents; THE DTMB MARK I KNOTMETER. (This report cited in this issue, see page 107.)

AUTOMATIC SENSOR FOR DETERMINING TEMPERATURE-HUMIDITY

A reliable and accurate automatic sensor of the wet- and dry-bulb type for indicating the temperature and humidity of an air stream has been developed. It is compact, rugged, and requires only reasonable maintenance procedures and has demonstrated its ability to perform well in all weather conditions without loss of accuracy. It will operate continuously and automatically untended with only routine interruptions necessary for calibration and inspection checks, which are of the simple go-no-go test type. Output of the system is in digital form. Developers say the sensor is the best known yet for micrometeorological purposes. Order AD-610 107; HC $3.00, M/F 75 cents; A WET- AND DRY-BULB TEMPERATURE MEASURING SYSTEM FOR MICROMETEOROLOGICAL APPLICATION. (This report cited in this issue, see page 7.)

ELECTRONICS

ELECTROCUTTING SINGLE CRYSTALS

A technique using electrochemical dissolution has been developed for slicing away single crystals from copper disks to prepare them for use as substrates in epitaxial thin film growth. The technique is adaptable primarily for soft metals where mechanical or abrasive cutting and polishing methods introduce physical defects and alter the original crystalline character of the material. Researchers say the method is applicable to a wide variety of single crystals. In the process, materials are oriented by X-ray crystallographic diffraction methods, then positioned geometrically in an electrolytic solution so that a given plane is made parallel to the solution surface. The cut is made on that plane. The exposed surface may then be polished, and the crystalline face can be used as a substrate for epitaxy with no additional defect introduced by the cutting procedure. Order AD-610 069, HC $1.00; M/F 50 cents; A METHOD FOR ELECTROCUTTING SINGLE CRYSTALS OF METAL AND ELECTRO-POLISHING THE EXPOSED CRYSTALLINE FACE. (This report cited in this issue, see page 92.)

HEATING, VENTILATING, & AIR CONDITIONING

OZONIDES FOR AIR REVITALIZATION

The potential of alkali metal ozonides for use in nonregenerative air revitalization systems has been clearly established by submarine engineers. Their recent studies dispel any fear that these materials are unusually dangerous to handle or so unstable as to make their engineering use impractical. Although potassium ozonide decomposes to superoxide and oxygen, the rate of decomposition is not excessive at normal cabin temperatures below 0°C. The discovery that bicarbonates are formed by the reaction of potassium ozonide with water vapor and carbon dioxide increases the attractiveness of this compound for air revitalization systems because of the favorable respiratory quotient obtained. Order N65-11050; HC $2.25, M/F 75 cents; THE SYNTHESIS AND UTILIZATION OF LOW MOLECULAR WEIGHT OZONIDES FOR AIR REVITALIZATION PURPOSES.

LUBRICANTS

COBALT ALLOYS FOR VACUUM BEARING SYSTEMS

Both molybdenum and tungsten cobalt alloys show promise as candidate materials for bearing systems for low-temperature high-vacuum operation. The addition of 25 percent molybdenum enables the cobalt to achieve a low friction coefficient--as low as 0.3 in vacuums. This is brought about because the molybdenum stabilizes the hexagonal crystalline form. The face-centered cubic form brought about by alloying with nickel has a high friction coefficient--as high as 1.5 and even complete welding of specimens in tests. A simple binary alloy of 32.6 percent tungsten in cobalt shows low wear and surface damage in vacuum despite relatively high friction. Order N65-12319; HC $1.00, M/F 50 cents; MARKED INFLUENCE OF CRYSTAL STRUCTURE ON THE FRICTION AND WEAR CHARACTERISTICS OF COBALT AND COBALT BASE ALLOYS IN VACUUM TO 10^{-9} MILLIMETER OF MERCURY. II -- COBALT ALLOYS.

METAL WORKING & FORMING

HIGH STRENGTH BERYLLIUM WIRE

High strength ultra-fine beryllium wire products with excellent ductility in the "as-drawn condition" may be produced from fine grained oxide dispersed phase alloys when the starting material is of very high purity. Strengths of 250,000 psi have been obtained — 25 percent greater than those previously reported. From starting material having -20 + 10 micron particle size, a 15 percent increase in tensile strength was gained in as-drawn 0.00477-inch wire. After pickling 0.001278-inch wire of high purity -15 + 1 electrorefined material, it showed a 25 percent increase in tensile strength. Order AD-610 316; HC $3.00, M/F 75 cents; DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE. (This report cited in this issue, see page 95.)

NUCLEAR TECHNOLOGY

HIGH ENERGY PHYSICS

Thirty leading theoretical physicists urge the construction of a super atom smasher that will let us probe much deeper into the mysteries of matter. In a book just published by the Brookhaven National Laboratory for the Atomic Energy Commission, the 30 articles were inspired by work of scientists and engineers who have been intensively pursuing studies on the design and experimental programs for a super accelerator in the high energy range of 600 to 1000 billion electron volts. According to L.C.L. Yuan, Chairman of Brookhaven's Super High Energy Physics Committee, the book should dispel any misunderstanding of the objectives of high energy physics, not only among the general public but also among the scientific community.

"These papers, for all their variety, clearly reveal one common belief," says Prof. J. Robert Oppenheimer in a foreword to the book. "All authors recognize that we do not understand the nature of matter, the laws that govern it, the language in which it should be described. They are all aware of the innumerable times in the years just past when something unpredicted, unexpected, and rather un-understood has come out of the great experimental centers.

"But there is more: they all have the gravest doubt that within the energy range now available, there are or will be enough clues to make possible for us a theory of the nature of matter. This is the constant theme in all the contributions, unifying them and giving them their thrust." Order BNL-888(T360); HC $1.75; NATURE OF MATTER: PURPOSES OF HIGH ENERGY PHYSICS.

PLASMA TECHNOLOGY

LASER INTERFEROMETER FOR PLASMA DIAGNOSTICS

The sensitivity of the laser interferometer can be greatly improved by using a spherical geometry reference cavity rather than one formed by planar mirrors. Such a modified device, which would be a particularly valuable tool for diagnosis of relatively dense to very dense gaseous plasmas, can detect resonant support of fields in the reference cavity at rates in excess of 50 resonances per 10-6 seconds. Researchers say this is sufficiently fast to investigate most plasma mediums of interest. It should be noted, however, that the laser interferometer is directly applicable to investigations of plasmas only if the plasma medium is homogenous over the cross-sectional area of the resonantly supported modes. Order AD-610 321, HC $3.00; M/F 75 cents; THEORY OF THE LASER INTERFEROMETER AND ITS USE IN PLASMA DIAGNOSTICS. (This report cited in this issue, see page 88.)

RESEARCH REVIEWS PACKAGED for INDUSTRY

by

The Institute for Applied Technology

National Bureau of Standards

Highlighted here are the first ten in the series, A Review of Selected U.S. Government Research and Development Reports.

The publications, priced at 50 cents each, contain resumes, abstracts and bibliographies of Federally sponsored research and development reports gathered under titles of special interest to industry.

They and the reports they refer to may offer ideas for product development or suggest means of reducing costs. The series, as well as most of the reports reviewed in it, are available from the Clearinghouse. New titles are in process. Please order by OTR number.

HOT MACHINING (OTR-101)

Hot machining offers easier and cheaper turning and milling of many metals and alloys, Government studies indicate. According to a summary describing these studies, the greatest improvements possible in tool life, cutting speeds, and costs are for hardened low alloy and tool steels. On AISI 4340 steel hardened to 600 Brinell, the summary indicates, there is an increase of tool life of 20 times at 900°F over that at room temperature for the same cutting speed. The increase in tool life of Thermold J alloy tool steel may reach 40 times, and increases of 5 to 7 times are noted for stainless steels. Results of tests on face- and end-milling steels are similar to those for turning. Milling of nickel and cobalt alloy requires higher work temperatures but is improved by the use of asbestos to lubricate or reduce the tool impact. Order from the Clearinghouse OTR-101, 50 cents.

NICKEL-TITANIUM ALLOYS (OTR-102)

Intensive Government research is in progress on nickel-titanium and other malleable intermetallic compounds with unusual high-strength at elevated temperatures, wear and corrosion resistance, and elastic and damping properties. The studies should increase knowledge of workability and structural properties, making the alloys more useful to industry. A summary describing the investigations indicates the so-called Nitanol series of nickel-titanium alloys with from 52 to 56 weight percent nickel offers many potential applications in nonmagnetic tools, bearings, instruments, underwater structures, chemical handling equipment, cutlery, vibration absorption devices, temperature-sensors, and wear resisting items. The alloys can be hot worked by extrusion, rolling, forging, or swaging down from ingot size at temperatures between 700 and 950°C. Hot-worked materials may then be worked at room temperatures with intermediate anneals. Alloys containing excess nickel (up to 62 percent by weight) are capable of being hot and cold worked with slightly more difficulty; however, they can be hardened by heat treatment to as high as 62 Rc. This hardness in a nonmagnetic corrosion-resistant material is exceptional. Order from the Clearinghouse OTR-102, 50 cents.

PHOTOCHROMISM and PHOTOTROPISM (OTR-103)

Government agencies have been responsible for important contributions in the fields of photochromisms and phototropism. Though the object of much of this research has been the development of eye protection against the flash of nuclear explosions, a summary describing the investigations indicates there are other potential applications for the findings. These include the development of objects for the control of sunlight exposure and/or snow glare, such as windows, window shades, windshields, and sunglasses, as well as optical memory devices for computers and valves for modulating or monitoring light. One project, for example, is aimed at development of a self-attenuating light valve as an eye-protective device. The researchers determined the properties of phototropic materials as well as design factors for a phototropic-type valve (filter). Such information, according to the summary, might be adapted to the design of light valves for both optical and nonoptical systems in which variation of the quantity of light is used in a modulating or monitoring capacity. Order from the Clearinghouse OTR-103, 50 cents.

FIRE–EXTINGUISHING MATERIAL TECHNOLOGY (OTR-104)

Both industries and communities stand to benefit from Government research in fire extinguishing materials. Though much of the research was aimed at solution of military and aerospace fire-control problems, a summary describing these investigations indicates a great deal of valuable information was gathered on some of the latest innovations for effective control of many kinds of fires. These include Class A type (ordinary flammable materials like wood) and Class B type (flammable liquids and gases). One particularly significant research project evaluated the effectiveness of increasing the viscosity of water by adding chemicals such as sulfonated polyvinyl toluene and caroxymethylcellulose. Large scale laboratory tests conducted by the Navy indicated a 75 percent improvement for such a mixture over plain water in Class A fire control. Researchers also determined optimum nozzle design and an effective sprinkler system for indoors. Order from the Clearinghouse OTR-104, 50 cents.

FLAME-RETARDANT TEXTILES (OTR-105)

Federal agencies are continuing efforts to improve the flame-resistance of fabrics. They have conducted important studies in such areas as fabric thermal conductivity and destructive temperatures as well as in testing apparatus to determine thermal behavior of fabrics. They have also sought to find coatings which make the more familiar materials such as nylon and cotton more fire-resistant. Much of this research has been successful and is of great value to industry, a summary describing the investigations indicates. The summary cites among several studies one that established the testing apparatus and analysis necessary to determine thermal conductivity of a fabric, the interface temperatures at the point of contact of the fabric with the backing materials, and the surface temperature at the point of contact with the flame. A triple treatment of divinylbenzene copolymer coated with tetrachlorodiamine and phosphonium chloride followed by copolymer coating to impart flame resistance to nylon was discovered in other research. A third study found certain catalysts to combine with tris-1-aziridinyl phosphone oxide to help produce durable flame resistancy in cellulosic fabrics. Order from the Clearinghouse OTR-105, 50 cents.

HUMIDITY-CONTROLLED WAREHOUSING (OTR-106)

Recent Government research has looked into preservation methods and the economics of storage in a variety of environments. Studies have also been made on storage of food, water, and equipment as well as on the design of humidity-controlled warehouses. The results of this research, according to a summary describing the studies, are of considerable value to manufacturers and others seeking to improve the storage life of materials. One 5-year study examined the effectiveness and economics of humidity-controlled storage of the following types of equipment: fluid-handling, motor-generators, automotive, heating, non-metallic, tools, instruments, and communications. Another study investigated the major aspects involved in successful warehousing, including identification and control of deterioration forces such as climate and corrosion. A third study discusses the use of thin metal-film corrosion indicators, devices that are sensitive to relative humidity above 40 percent and indicate the amount present by changes in color of the film-coated area from silver-gray to orange-brown. Order from the Clearinghouse OTR-106, 50 cents.

CONCRETE TECHNOLOGY (OTR-107)

Considerable progress has been made by Government laboratories and cooperating private research institutions in the improvement and application of concrete and its constituent materials during recent years. A summary describing these studies indicates they will help private industries initiate many improvements in existing products as well as establish new applications. One outstanding study described in the summary established that nylon and other plastic fibers when added to the mix, impart tremendous strength and resiliency to concrete. Nylon increases strength to more than 27 times that of unreinforced concrete. The plastic fiber additions may prove to be superior to steel wires because the latter increase flexural strength and shatter resistance but not resiliency. The summary discusses work in these major areas: (1) improvement of strength or decreased water transmission through conventional composition concrete; (2) improved shock resistance in lightweight concrete; (3) strength and corrosion protection of steel-reinforced concrete; (4) prestressed concrete applications; and (5) protective coatings for concrete. Order from the Clearinghouse OTR-107, 50 cents.

VOLATILE CORROSION INHIBITORS (OTR-108)

Studies carried out by Government agencies show that volatile corrosion inhibitors have potentially wide application in delivering products to the consumer in more ready-to-use condition. According to a summary prepared by technologists of the Institute for Applied Technology, National Bureau of Standards, volatile corrosion inhibitors will succeed when used with effective moisture resistant packaging materials. Researchers therefore developed a heat-sealable polyester material to be used with a volatile corrosion inhibitor to provide protection in very humid environments. Steel items so packaged withstood corrosive attack for 12 months in very humid environments and for longer periods in less humid storage areas. The summary describes studies carried out in three broad areas: evaluation of the time in which steel is fully protected under varying external conditions, effect of inhibitor materials upon nonferrous metals, and the effect of the outside packaging materials. Order from the Clearinghouse OTR-108, 50 cents.

GREASE LUBRICATION (OTR-109)

Research in grease lubrication conducted by Federal agencies will provide useful information to manufacturers and others. The studies determined how to increase the life of steel parts exposed to sliding, rubbing, and rolling friction, together with heavy loadings and vibrations. A summary describing this research discusses surfaces in contact with lubrication formulations, additives to reduce corrosion, and variations in method and degree of loading and vibration. Additives such as imide-type thickeners are possible for enabling greases to perform well at high temperatures, for example. One aluminum imide thickener tested has a melting point of over 1000°F. Twenty-one greases in various proportions are identified in another study discussed in the summary. Some of these formulations achieved favorable performance after prolonged periods of testing. The summary also gives bibliographies of reports. Order from the Clearinghouse OTR-109, 50 cents.

THERMOELECTRIC MATERIALS and FABRICATION (OTR-110)

Because thermoelectric generators enjoy several advantages over conventional power sources for low power application, considerable Government-supported R&D has been devoted to improving the efficiency and reliability of thermoelectric materials, while other projects have been concerned with determining methods and materials for joining thermoelectric materials to metallic connectors. Although not yet economically suitable for large scale energy conversion, actual units have been developed for certain specialty applications. Notable among these is a 35-pound propane fired portable generator which has demonstrated the capability of producing 267 watts. A 100-watt generator powered by radioisotopes operates at 554°C and 171°C hot and cold sides respectively and attains an overall efficiency of 5.2 percent. The principal advantages of these portable power packs are their small size and low weight, ease of maintenance, and silence of operation. They can be coupled to a variety of heat producing sources including engines and nuclear plants. Order from the Clearinghouse OTR-110, 50 cents.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-609 907 Div. 1
OTS Prices: HC $2.00/MF $0.50

Naval Air Engineering Center, Philadelphia, Pa.
DETERMINATION OF FATIGUE CHARACTERISTICS OF A TYPICAL NOSE LANDING GEAR,
by M. S. Rosenfeld and R. J. Zoudlik. 21 Dec 64, 35p
NAEC ASL1079 Unclassified report

Descriptors: (*Landing gear, Fatigue (Mechanics)), Test methods, Loading (Mechanics), Life expectancy, Stresses, Mathematical analysis, Tests, Structures.

Twenty identical, unused nose landing gears were tested to determine the structural fatigue characteristics of these structures. Twelve specimens were tested under constant-amplitude loading and eight under spectrum loading. The constant-amplitude tests were cycled between a lower load level of zero and various upper load levels including a maximum value of 140 percent limit load. The spectrum tests were performed for three different spectra. For each spectrum the load was cycled from a lower load level of zero to the various upper load levels associated with each spectrum. Preliminary results from this and other investigations indicate that use of the Miner-Palmgren hypothesis results in conservative estimates of life compared to actual values obtained from spectrum tests at R>0 and results in unconservative estimates when compared to actual values obtained from spectrum tests at R<0. (Author)

AD-609 913 Div. 1, 26
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGN AND ECONOMICS OF AIRCRAFT,
by D. L. Tomashevich. 15 Dec 64, 258p
FTD MT64 102; TT 65 60694
Unclassified report

Edited machine trans. of mono. Konstruktsiya i Ekonomika Samoleta, Moscow, 1960, 202p.

Descriptors: (*Aircraft, Design), Economics, Aerodynamic characteristics, Drag, Weight, Mathematical analysis, Differential equations, Production, Costs, USSR.

Contents: Weight and aerodynamic improvement of aircraft; Examples of determination of loss from weight and loss from drag; Determination of loss from parameters of aircraft; Determination of expediency of design measures; Examples of increase of efficiency of aircraft; Determination of expenditures on increase of flying characteristics of aircraft; Comparison of efficiency of aircraft of identical assignment; Special cases of determination of loss from weight and loss from drag.

AD-609 938 Div. 1, 32
OTS Prices: HC $3.00/MF $0.75

Flight Safety Foundation, Inc., New York.
SYNTHESIS OF IMPACT ACCELERATION TECHNOLOGY FOR AVIATION CRASH INJURY PREVENTION (PROJECT SIAT).
by C. O. Miller. Jun 63, 76p
Contract DA44 177AMC888T, Task 1A024701A12101
TRECOM TR63 31A
Unclassified report

Descriptors: (*Aviation safety, Information retrieval), (*Information retrieval, Aviation safety), Aviation injuries, Aviation accidents, Impact shock, Acceleration, Tolerances (Physiology), Hazards, Punched cards, Safety, Design, Test methods, Analysis, Collecting methods, Synthesis.

The report describes the search and collation of currently available acceleration literature and related information of interest in aviation crash injury prevention. Approximately nine hundred documents unique to this study were catalogued. An information retrieval system was devised to facilitate future crash injury research using these data. Major categories in which information relative to impact acceleration has been collected are as follows: hazard exposure, crash loads, human tolerance, design, and test/ analysis methodology. The primary effort during the study was devoted to collecting the data. However, the scores of personal contacts made throughout the industry during the program and the study of the documents themselves provided a general insight into the nation's technology in impact acceleration related to crash injury research. (Author)

AD-609 939 Div. 1, 32
OTS Prices: HC $4.00/MF $0.75

Flight Safety Foundation, Inc., New York.
BIBLIOGRAPHY OF IMPACT ACCELERATION LITERATURE. ANNEX TO SYNTHESIS OF IMPACT ACCELERATION TECHNOLOGY FOR AVIATION CRASH INJURY PREVENTION (PROJECT SIAT),
by Lillian Cambeis. Jun 63, 107p
Contract DA44 177AMC888T, Task 1A024701A12101
TRECOM TR63 31B
Unclassified report

See also AD-609 938.

Descriptors: (*Aviation safety, Information retrieval), (*Bibliographies, Aviation safety), Aviation injuries, Aviation accidents, Impact shock, Acceleration, Tolerances (Physiology), Hazards, Safety, Synthesis, Test methods, Analysis, Design.

The bibliography is part of work performed on Project SIAT (Synthesis of Impact Acceleration Technology for aviation crash injury prevention). A major part of this program entailed the collection and collation of information pertaining to the impact acceleration aspects of crash injury research (see AD-609 938). The resultant bibliographic material is herein listed as a separate annex to the basic report to facilitate its handling.

AD-610 029 Div. 1, 9
OTS Prices: HC $7.00/MF $1.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
TABLES OF TWO-DIMENSIONAL OSCILLATING

AIRFOIL COEFFICIENTS FOR ROTARY WINGS.
Technical rept.,
by Raymond A. Piziali. Oct 64, 322p
CAL BB-1898-S-1
Contract DA44 177AMC119T, Task 1D121401A14203
TRECOM TR64 53
Unclassified report

Descriptors: (*Rotary wings, Oscillation), Tables, Statistical data, Lift, Airfoils, Two-dimensional flow, Mathematical analysis, Aeroelasticity, Rotation, Frequency, Functions.

Tables of numerical values of Loewy's modified two-dimensional lift-deficiency function for rotor blades are presented in the report. The lift-deficiency function is tabulated for a greater range of parameter values and for smaller increments than were previously available. The parameters referred to are the reduced frequency, the ratio of blade oscillatory to rotor rotational frequency, and the rotor inflow ratio. A brief description of the manner in which these tabulations are utilized is included. (Author)

AD-610 040 Div. 1, 9, 11
OTS Prices: HC $3.00/MF $0.75

Princeton Univ., N. J.
AN INVESTIGATION OF A DYNAMIC INSTABILITY OF A WINGED GEM,
by P. M. Condit and J. E. Harrington. Dec 64,
57p AER-692
Contract DA44 177AMC64T, Task 1D021701A04802
TRECOM TR64 54
Unclassified report

Descriptors: (*Wing-body configurations, Ground effect machine), (*Ground effect machines, Stability), Wings, Aerodynamic characteristics, Center of gravity, Wind tunnel models, Performance (Engineering).

The report covers an experimental investigation of the lateral dynamic stability characteristics of winged GEM. The causes of instability are determined and a method of correcting the condition proposed. (Author)

AD-610 125 Div. 1
OTS Prices: HC $3.00/MF $0.75

General Mills, Inc., St. Paul, Minn. Electronics Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON. BALLOONS WITH ZERO SUPERPRESSURE AND ZERO CIRCUMFERENTIAL STRESS.
Scientific rept. no. 2,
by Justin H. Smalley. 31 Dec 63, 58p GMI-2500
Contract AF19 628 2783, Proj. 6665
AFCRL 64 734
Unclassified report

Descriptors: (*Balloons, Geometric forms), Inflatable structures, Configuration, Stresses, Aerodynamic loading, Aerodynamic characteristics, Mathematical prediction, Numerical methods and procedures, Aircraft.

This report, the second of a series, presents the numerical methods used and the results of the computation of the shapes of axi-symmetric free balloons. Flat-top balloons, re-entrant top balloons and double balloons, all with zero circumferential stress and zero superpressure at the bottom apex, are considered. Meridional film loads are presented. An extensive Sigma Table suitable for balloon design is included for the flat-top balloon with sigma = 0(0.05) 1.0. (Author)

AD-610 219 Div. 1
OTS Prices: HC $3.00/MF $0.75

Hydronautics, Inc., Laurel, Md.
THE STATIC PERFORMANCE OF GROUND EFFECT MACHINES WITH ASPECT RATIOS OF 1/3, 2/3, 1-1/2, and 3.
Final technical rept.,
by Emanuel S. Curtis and Mark W. Chodoff.
Dec 64, 56p Hydro-TR-011-6
Contract Nonr318900, Proj. SR009 01 01
Unclassified report

Descriptors: (*Ground effect machines, Performance (Engineering)), Performance (Engineering), Ground effect, Stability, Lift, Moments, Pressure, Gas flow, Pitch (Motion), Aerodynamic configurations, Nozzles, Jets, Theory, Experimental data, Aspect ratio.

The results of an experimental investigation of the static pitch performance of aspect ratios 1/3, 2/3, 1-1/2, and 3 ground effect machine models with interior nozzles are presented. The investigations consisted of the measurement of the lift, moment, plenum chamber pressure, and rate of air flow to the models at three heights and for various pitch angles. These studies show that the four configurations are statically stable and have restoring moments at all of the heights for which tests were conducted. Observations of the flow beneath the model were made in an effort to gain an understanding of the role of the interior jets on the stability of the models. Comparisons of these experimental results and those for an aspect ratio 2/3 model without an interior nozzle are made with those predicted using the thin jet theory in an effort to determine the validity of the theory. It is shown that the thin jet theory satisfactorily predicts the lift and moment of a ground effect machine at high heights only. (Author)

AD-610 256 Div. 1, 27, 30
OTS Prices: HC $4.00/MF $1.00

IIT Research Inst., Chicago, Ill.
EXPERIMENTAL NOISE INVESTIGATION OF MODEL NOZZLES.
Rept. for Nov 63-Dec 64,
by David F. Pernet. Dec 64, 149p
Contract AF33 615 1164, Proj. 3066, Task 306601
APL TR64 138 Unclassified report

Descriptors: (*Jet plane noise, Exhaust nozzles), (*Exhaust nozzles, Jet plane noise), (*Acoustics, Nozzle gas flow), Sound, Pressure, Thrust, Anechoic chambers, Models (Simulations), Jet engine noise, Mathematical analysis.

Far field sound pressure levels were measured in an anechoic room for noise generated by cold air flow through a wide variety of small nozzle configurations. These nozzles included converging, converging-diverging, annular plug, annular center core flow, and ejector types. The results are examined in terms of mass flow and acoustic power performance. Thrust determinations were made for selected nozzles showing good acoustic performance, permitting an ultimate evaluation of their acoustic performance in terms of their thrust performance. Optimized nozzles from each of four nozzle configurations are recommended for a full-scale evaluation. These are a plug, a center core flow, a converging-diverging, and a converging-diverging plug nozzle. The noise generated by hot air flow through a converging nozzle was determined, enabling only partial corroboration of the scaling technique developed in a previous study. One of the recommended nozzle types, the plug nozzle, was investigated under hot flow conditions and its acoustic performance was found to remain superior to that of a converging nozzle. (Author)

AD-610 296 Div. 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
POWERED ORNITHOPLANE,
by I. N. Vinogradov, R. I. Vinogradov, and V. M. Andreyev. 7 Jan 65, 7p FTD-TT-64-630
TT 65 61008

Unclassified report

Unedited rough draft trans of Russian patent no. 159407 (appl. no. 814470/40-23, 21 Jan 63).

Descriptors: (*Airplanes, Design), Patents, USSR, Flaps, Feathers, Hydraulic equipment, Power, Test vehicles.

The nature of the proposed invention lies in the fact, that for the purpose of increasing lift and thrust at the wing tips are used propelling tops (manus), consisting of feather-like vanes, made of synthetic material, with metal longerons. The vanes are arranged in fan-shape in one block executing reversive-torsional oscillations, transmitted by a helicoidal automat, consisting of a hinge jointed telescopic wing section longerons, power cylinders with supports on telescopic longerons and spring blocking of lingerons in the hoops of the cylinders. For transverse control ability of ornithoplane on its horizontal empennage are mounted side flaps, capable of being deflected in every side and kinematically connected with cable wire with slats.

AD-610 303 Div. 1
OTS Prices: HC $6.00/MF $1.25

Battelle Memorial Inst., Columbus, Ohio.
DESIGN CRITERIA FOR HIGH-SPEED POWER-TRANSMISSION SHAFTS. PART II. DEVELOPMENT OF DESIGN CRITERIA FOR SUPERCRITICAL SHAFT SYSTEMS.
Rept. for 15 Jan 63-30 Sep 64,
by J. E. Voorhees, H. C. Meacham, J. B. Day, and D. E. Close. Dec 64, 207p
Contract AF33 657 10330, Proj. 8128, Task 812802
ASD TDR62 728 P2

Unclassified report

See also AD-299 027.

Descriptors: (*Drive shafts, Transmissions), (*Helicopter rotors, Drive shafts), Performance (Engineering), Feasibility studies, Mathematical analysis, Vibration, Damping, Velocity, Torque, Moments, Supports, Design.

The purpose of the project was to determine the feasibility of operating power-transmission shafts at supercritical speeds. It was determined that supercritical speed operation was definitely feasible. By use of the proper damper to damp lateral vibrations of the shaft, shafts were operated through speed ranges including the 20th critical speed. Work was conducted to determine the relative importance of various parameters to shaft performance at critical speeds. The following factors were found to be of primary importance: damper location, shaft mass eccentricity, damper weight, damper damping coefficient, damper moment restraint, and quality of shaft end connections (such as universal joints). A preliminary design of supercritical shaft system for a Vertol 'Chinook' helicopter was made. A design manual was written summarizing the design procedure for supercritical shaft systems.

2. Astronomy, Geophysics and Geography

AD-609 914 Div. 2
OTS Prices: HC $7.00/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CLIMATE OF THE USSR, NO. 4, WESTERN SIBERIA,
by V. V. Orlova. 29 Dec 64, 395p
FTD MT63 337; TT 65 60695

Unclassified report

Zapadnaya Sibir', edited machine trans. of Klimat SSSR, 1962, no. 4, p. 1-360.

Descriptors: (*Climatology, Siberia), (*Siberia, Climatology), Solar radiation, Thermal radiation, Moisture, Wind, Meteorological parameters, Meteorological phenomena, Geography, Forestry, Weather stations, USSR.

This monograph is one of the issues of the series 'Climate of the USSR' and presents a description of the climate of Western Siberia. The book contains the characteristics of the main climate-forming factors, the general characteristics of the climate of Western Siberia by seasons, and a description of its separate elements (thermal regime, moistening conditions, etc.) in connection with the physico geographic peculiarities of the territory. Furthermore, in it climatic regionalizing is presented, as well as a description of the climate of the separate regions. The book is designed for scientists and specialists in the regions of climatology, agriculture, and geography, for teachers, students of higher educational institutions, and also for a wide circle of readers. (Author)

AD-609 915 Div. 2, 25, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STELLAR PHOTOMETER AND SPECTROMETER FOR THE 1-2.5 MICRON RANGE,
by V. I. Moroz. 3 Dec 64, 16p
FTD TT64 369; TT 65 60696

Unclassified report

Unedited rough draft trans. of mono. Novaya Tekhnika v Astronomii (New Equipment in Astronomy) Moscow, 1963, p. 149-156.

Descriptors: (*Infrared spectrophotometers, Astronomy), (*Astronomy, Infrared spectroscopy), Spectrum analyzers, Photosensitivity, Photoelectric materials, Infrared photoconductors, Germanium, Lead compounds, Sulfites, Infrared optical systems, Wiring diagrams, Jupiter, Saturn.

Two instruments are described, the stellar photometer and the infrared spectrometer, which are used for conducting astronomical observations. The instruments are used to measure the flux from the Crab Nebula in the range 1 to 2.5 angstroms and to investigate the spectrum of the radiation of the night sky and the spectra of Jupiter and Saturn.

AD-609 928 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
THE INTERNATIONAL SYMPOSIUM ON RECENT MOVEMENTS OF THE EARTH'S CRUST (NO. 1),
by Yu. A. Meshcheryakov. Jun 64, 16p
AmMetSoc T-R-443
Contract AF19 628 3880
TT 65 60700

Unclassified report

Pervyi Mezhdunarodnyi Simpozium po Sovremennym Dvizheniyam Zemnoi Kory, trans. of Geofizicheskii Byulleten' (USSR) 1963, no. 13, p. 67-73.

Descriptors: (*Geodesics, Symposia), (*Earth, Structural geology), (*Geophysics, Symposia), Scientific organizations, Scientific research, Geology, Lithosphere, Motion, Reports, Reviews, USSR.

The symposium was opened on 22 May 1962 in Leipzig. Sixty two papers were read and discussed. At the sessions, simultaneous translations were made into English, German, Russian, and French. The titles of the papers and the authors are listed.

AD-609 929 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
TRIGONOMETRIC LEVELING ALONG THE PROFILE KOMSOMOL'SKAYA-SOVETSKAYA-VOSTOK-KOMSOMOL'SKAYA,
by G. E. Lazarev. Jun 64, 17p AmMetSoc T-R-444
Contract AF19 628 3880
TT 65 60701

Unclassified report

Trigonometricheskie Nivelirovanie na Profile Komsomol'skaya-Sovetskaya-Vostok-Komsomol'skaya, trans. of Geofizicheskii Byulleten' (USSR) 1963, no. 13, p. 49-56.

Descriptors: (*Geodesics, Polar regions), (*Polar regions, Geodesics), Surveying, Trigonometry, Geophysics, Astronomical geodesics, Height finding, USSR.

AD-609 931 Div. 2, 4, 25
OTS Prices: HC $4.00/MF $1.00

Philco Research Labs., Newport Beach, Calif.
ABSORPTION BY CO2 BETWEEN 4500 AND 5400 CM-1,
Scientific rept.,
by Darrell E. Burch, David A. Gryvnak and Richard R. Patty. 15 Dec 64, 144p U-2955
Contract Nonr356000, ARPA Order 237

Unclassified report

Descriptors: (*Carbon dioxide, Absorption spectrum), (*Infrared radiation, Absorption), (*Atmosphere, Carbon dioxide), Nitrogen, Planetary atmospheres, Spectroscopy, Band spectrum, Spectrum analyzers, Tables.

The absorption by 38 different samples of CO2 in the 4500 - 5400/cm (near 2 microns) region was studied with the use of a spectrometer having a spectral resolution between approximately 0.3 and 1/cm. Samples of CO2 and CO2 + N2 were contained in two different absorption cells; one having a maximum path of 933 meters and used at a maximum pressure of 2.5 atm. The other was used at paths as long as 32.9 meters and at pressures as high as 15 atm. Photographs of the spectra of every sample as well as a table of transmittance versus wavenumber are included. Also presented is a table of the

integrated absorptance versus wavenumber, where approximately 600 values are tabulated for the largest samples. (Author)

AD-609 936 Div. 2
OTS Prices: HC $3.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
PROCEEDINGS OF AFCRL WORKSHOP ON 20 JULY 1963 SOLAR ECLIPSE.
Special repts.,
ed. by J. A. Klobuchar and R. S. Allen. Dec 64, 73p
Proj. 5629
AFCRL 64 962; AFCRL SR13

Unclassified report

Conference held at the Air Force Cambridge Research Labs., Bedford, Mass., 1 Jun 64.

Descriptors: (*Solar eclipses, Symposia), (*Radio astronomy, Solar eclipses), Extraterrestrial radio waves, Ionospheric propagation, L band, Microwaves, Ultrahigh frequency, Radio interference, Solar radiation, Ionosphere, Atmospheric sounding, Electron density, Instrumentation, Reports, Air force research.

A conference was held at the Air Force Cambridge Research Laboratories on June 1, 1964 to discuss solar radio data and ionospheric effects of the total solar eclipse of July 20, 1963. A total of fifteen papers and summations of experiments performed and observations made during the eclipse were discussed at this workshop conference. This written proceedings of the conference is divided into three parts beginning with a part on solar radio flux measurements, continuing with a part on direct, quantitative measurements of ionospheric parameters, and concluding with one on indirect effects of ionospheric changes.

AD-609 941 Div. 2, 30
OTS Prices: HC $5.00/MF $1.25

American Science and Engineering, Inc., Cambridge, Mass.
COMPUTER PROGRAMS AND NUMERICAL RESULTS RELATED TO THE PROBLEM OF THE SOLAR WIND.
Final rept. pt. 2,
by Yvain M. Treve. 1 Jul 64, 186p ASE-653
Contract AF19 628 2388, Proj. 8647, Task 864701
AFCRL 64 594 P2

Unclassified report

Descriptors: (*Solar wind, Numerical analysis), (*Programming (Computers), Astronomy), (*Numerical methods and procedures, Astronomy), (*Astronomy, Solar wind), Hydrodynamics, Astrophysics, Mathematical models, Differential equations, Integration, Programming languages, Atmosphere, Evaporation, Solar corona, Tables.

Numerical integrations of the differential equations of several hydrodynamical models of the solar wind have been performed for various sets of initial conditions. The method of integration is described and a summary of the results given together with a listing of the FORTRAN programs used. Also included are tables of various quantities related to the theory of atmospheric evaporation as applied to the solar corona. (Author)

AD-609 943 Div. 2, 4
OTS Prices: HC $2.00/MF $9.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
NITROGEN OXIDES IN THE CHEMOSPHERE.
Scientific rept.,
by Marcel Nicolet. 10 Dec 64, 36p IRL-227
Contract AF19 628 4014, Grant NSF GP2914,
Projs. 8605, 5710, Task 860502

Unclassified report

Descriptors: (*Ionosphere, Chemical properties), (*Nitrogen compounds, Oxides), Stratosphere, Ozone, Oxygen, Nitrogen, Nitric acid, Chemical reactions, Dissociation, Thermochemistry, Photochemistry.

A study was made of the various reactions in which nitrogen oxides are involved in the chemosphere. The hydrogen compounds do not play an important role, and it was found that the essential aeronomic reactions depend on ozone and atomic oxygen. Thus, the ratio nitrogen dioxide-nitric oxide can be determined. The absolute values of the NO2 and NO concentrations depend on the dissociation of molecular nitrogen in the chemosphere. The chemical conditions cannot be applied in the mesosphere since the life-time of NO is relatively long, and a downward transport is involved. Very special assumptions concerning chemical reactions would be necessary to reconcile the photochemical picture and the observational results. The introduction of ionic reactions will lead to a correct interpretation. (Author)

AD-609 961 Div. 2, 20
OTS Prices: HC $1.00/MF $0.50

Minnesota Univ., Minneapolis. School of Physics.
INTENSITY OF 80 TO 200 MEV PROTONS OVER FORT CHURCHILL ON 26 AUGUST 1960.
Technical rept.,
by P. S. Freier and C. J. Waddington. Nov 64, 21p
CR-73
Contract Nonr71060

Unclassified report

Descriptors: (*Solar radiation, Intensity), (*Cosmic rays, Protons), (*Protons, Intensity), Solar spectrum, Solar flares, Energy, Emissivity, Measurement, Monitors, Canada.

The intensity and energy spectrum of primary cosmic ray protons having energies between 80 and 200 MeV have been studied in nuclear emulsions flown on 26 August 1960 over Fort Churchill. The upper limit to the intensity between 80 and 150 MeV of 53±6 protons/sq M.sec.ster obtained in this experiment is compared with with the value of 121±6 protons/sq M.sec.ster quoted by Vogt (Primary cosmic ray and solar protons, Phys. Rev., 125:366-377, 1962) from observations made just prior and just after this experiment. The reasons for this difference are discussed, and it is concluded that it is now unnecessary to make any assumptions for a relaxed modulation mechanism or for continuous solar emission of low energy protons. (Author)

AD-609 979 Div. 2
OTS Prices: HC $3.00/MF $0.75

New England Univ., Armidale NSW, (Australia).
IONIZATION GROWTH AT SUNRISE IN THE E-F REGION OF THE IONOSPHERE.
Scientific rept. no. 2,
by C. S. G. K. Setty, R. A. Smith, and I. A. Bourne.
24 Jun 64, 55p
Contract AF19 604 6177, Proj. 7663, Task 766302
AFCRL 64 516

Unclassified report

Sponsored in part by Defense Atomic Support Agency, Washington, D. C.

Descriptors: (*Photoelectric effect, Ionosphere), (*Ionosphere, Photoelectric effect), (*Sun, Photoelectric effect), Solar radiation, Ionization, Upper atmosphere, Electron density, Ultraviolet radiation, Electromagnetic wave reflections, Measurement, Geophysics, Data, Tables, Instrumentation.

Ionograms, recorded near sunrise using a Cossor ionosonde with an array of 40 dipoles for 1.515 Mc/s, the gyro-frequency in the lower E-region, show increased group retardation of extraordinary F-echoes at frequencies near 2 Mc/s commencing when the sun's zenith angle is between 96 degrees and 98 degrees. This is followed by the appearance of stratifications in the E-F region. There is good agreement in the sunrise period between the observed ionization growth and that calculated for the solar radiations 911-1027 A and 10-170 A, which produce their maximum photoionization of O2 during the day at the peak of the E-region. (Author)

AD-609 997 Div. 2
OTS Prices: HC $5.00/MF $1.25

Air Force Cambridge Research Labs., Bedford, Mass.
GEOPHYSICS AND SPACE DATA BULLETIN NUMBER 2,
ed. by Anne L. Carrigan and Norman J. Oliver.
Oct 64, 196p

Unclassified report

See also AD-606 190.

Descriptors: (*Geophysics, Periodicals), (*Space environmental conditions, Periodicals), Magnetometers, Cosmic rays, Neutrons, Intensity, Monitors, Meteorological radar, Extraterrestrial radio waves, Measurement, Data, Tables, Graphics, Propagation.

This Bulletin is Number 2 of a quarterly series. It contains continuations of most of the data presented in Bulletin Number 1 (AD-606 190) plus a new section on Oblique H-F Propagation. Topics included in this bulletin are: Component magnetometer, cosmic ray neutron intensity monitor, oblique backscatter radar, Oblique H-F propagation, riometer, and solar radio emission--spectral observations.

AD-610 001 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
LOCAL SEISMICITY INVESTIGATIONS FOR ON-SITE INSPECTIONS,
Quarterly rept. no. 4, 1 Oct 64-1 Jan 65,
by Warren H. Westphal. 11 Jan 65, 5p
Contract AF49 638 1363, ARPA Orders 292, 500

Unclassified report

Descriptors: (*Seismology, Recording systems), (*Earthquakes, Recording systems), Seismographs, Magnetic tapes, Amplifiers, Signal generators, Circuits, Moistureproofing, Containers, Nuclear explosions, Underground explosions, Geophysics, Idaho, Utah.

This project was devoted towards measurements of local seismicity following the SALMON event of Project DRIBBLE, the measurements of local earthquakes in the Bannock thrust of southeastern Idaho and the Juab Valley graben near Nephi, Utah.

AD-610 019 Div. 2, 24
OTS Prices: HC $2.00/MF $0.50

Chicago Univ., Ill.
A STUDY OF CUMULUS CLOUDS OVER THE FLAGSTAFF RESEARCH NETWORK WITH THE USE OF U-2 PHOTOGRAPHS.
Scientific rept. no. 3,
by Dorothy L. Bradbury and Tetsuya Fujita. Jul 64,
31p SMRP-RP-33
Contract AF19 604 7259, Grant NSF G18984,
Proj. 8620, Task 862002
AFCRL 64 895

Unclassified report

Descriptors: (*Cumulus clouds, Aerial photography), (*Aerial photography, Cumulus clouds), Meteorology, Photographic reconnaissance, Photogrammetry, Cloud cover, Terrain, Rectifiers (Photography), Weather forecasting, Arizona.

Using cloud photographs taken by a U-2 aircraft equipped with a 180-deg panormaic camera, a technique of rectification is described. Mosaics of 13 passes over the San Francisco Mountains were made with the rectified cloud photographs. Computations of cloud movement and change in the horizontal area of cloud were made by use of cloud and cloud shadow. It was found that the computed cloud motions are within the range of the wind speeds reported from nearby upper air reporting stations. (Author)

AD-610 044 Div. 2, 24
OTS Prices: HC $3.00/MF $0.75

Link Div., General Precision, Binghampton, N. Y.
AUTOMATIC POINT MARKING MEASURING AND RECORDING INSTRUMENT.
Final technical rept. for 31 Mar 61-31 Aug 64,
by M. Allen, E. Paufve, I. Shim, and R. Woodson.
23 Dec 64, 63p Link-645
Contract DA44 009ENG4775, Proj. 8T35 11 001 05

Unclassified report

Descriptors: (*Mapping, Recording systems), (*Recording systems, Photogrammetry), (*Photogrammetry, Recording systems), Automatic, Photographic images, Correlation techniques, Correlators, Optical scanning, Stereoscopic map plotters, Position finding, Television display systems, Photographic equipment, Optical equipment, Mechanical drawings, Geodesics.

This report covers the development of the Automatic Point Marking Measuring and Recording Instrument. A summary is presented which describes the purpose of the program and the results of the effort expended. The report describes the general operation and content of the various subsystems and includes illustrations. Some of the techniques and approaches investigated during the course of this program are discussed with particular emphasis on the schemes finally chosen. The report concludes with a complete and thorough list of comments and recommendations for improvements and extended capabilities for future generations of the APMMRI. (Author)

AD-610 047 Div. 2
OTS Prices: HC $2.00/MF $0.50

Lamont Geological Observatory, Palisades, N. Y.
SOME HYDRODYNAMIC PROBLEMS FOR A NEPHELOID ZONE.
Technical rept.,
by Takashi Ichiye. Dec 64, 29p
CU-16-64AT30-1-2663, CU-10-64Nonr266(48)
Contracts AT30 1 2663, Nonr26648

Unclassified report

Descriptors: (*Ocean currents, Ocean bottom), (*Atlantic Ocean, Marine geophysics), Coriolis

effect, Hydrodynamics, Sea water, Density, Viscosity, Gravity, Mathematical analysis.

A layer of a few hundred meters' thickness with suspended matter near the bottom on the continental slope of the North Atlantic (a nepheloid zone) discovered by Ewing and Thorndike seems to produce bottom currents, because heavier water near the bottom due to suspended matter slides down the slope. When only the Coriolis' force balances with this gravity effect, the bottom current flows southwestwards along the slope with the maximum velocity of about 10 (cm/sec) for a slope of one degree. The effect of gravity on a fluid in hydrostatic equilibrium with locally variable density above the sloping bottom is discussed and the extra term due to the density gradient along the slope is derived. The vertical profiles of the currents are determined when the vertical eddy viscosity works beside the Coriolis' force. Two kinds of eddy viscosity distributions estimated from the observed nepheloid distributions are used. The inertia terms were found to be more important to turbidity currents than Coriolis' force. (Author)

AD-610 048 Div. 2, 15
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
FURTHER REMARKS ON THE RESTRICTED PROBLEM OF THREE BODIES--A NEW PROOF OF A THEOREM OF J. MOSER.
Professional paper,
by Richard B. Barrar. 13 Oct 64, 18p
SP-1488/001/00

Unclassified report

Descriptors: (*N-body problem, Theorems), (*Orbital trajectories, N-body problem), Celestial mechanics, Equations, Motion, Circular orbit trajectories, Elliptical orbit trajectories, Mapping (Transformations), Power series, Gravity, Partial differential equations, Invariance, Transformations (Mathematics), Mathematical analysis, Differential geometry, Real numbers, Prime numbers, Tracking.

In a recent paper (Barrar, 1964), it was shown that the result of R. Arenstorf (1963) on the existence of periodic orbits of the second kind for the restricted problem of three bodies can be very readily obtained with the use of Delaunay or Poincare variables. In the present paper it will be shown that the results of J. Moser (1953) can also be more readily obtained with the use of Poincare variables. Moser, dealing with the restricted problem of three bodies, demonstrated the existence of periodic solutions that close after many revolutions and are near periodic solutions of the first kind. (Author)

AD-610 051 Div. 2
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PHOTOGRAPHIC POLARIMETRY OF THE MOON WITH LIGHT FILTER,
by N. P. Barabashov and I. K. Koval. Dec 64, 8p
RSIC 349; TT 65 60767

Unclassified report

Trans. of Akademiya Nauk SSSR, Komissiya po Fizike Planet. Izvestiya, 1959, v. 1, p. 55-58.

Descriptors: (*Moon, Optical properties), Light, Polarization, Colors, Photographic analysis, Lunar environment, USSR.

A study of polarization characteristics of the lunar features with regard to the wave length of light yielded the following results: (1) The majority of studied lunar details has maximum degrees of polarization in blue rays, which, on the basis of the results obtained by Umov, are in agreement with a positive value for the color index of the moon. (2) Certain lunar details have a maximum degree of polarization in red rays which may indicate the presence of a green or blue hue. (3) Considering only red and blue light filters, the degree of polarization on a large lunar region has a maximum in blue along Tycho's ray; after that, the curves run almost together. This agrees with a fact that the red shade is seen (as in the crater) up to a certain distance from the crater of a given ray. (4) A lunar polarimetric method with filters can produce interesting results, especially if we compare them with similar measurements of terrestrial substances. (5) The experiment of photographic polarimetry of the moon with light filters has shown that identical measurements with the help of electropolarimetry will be more precise and less laborious. (Extracted)

AD-610 053 Div. 2, 12, 15, 16, 30
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COSMIC RESEARCH, 1964, VOL. 2, NO. 6.
13 Jan 65, 233p
FTD TT64 1316; TT 65 60768

Unclassified report

Unedited rough draft trans. of Kosmicheskie Issledovaniya (USSR) 1964, v. 2, no. 6, p. 817-956.
See also AD-608 083.

Descriptors: (*Space flight, Scientific research), (*Space environmental conditions, Scientific research), USSR, Motion, Orbital trajectories, Planets, Moon, Descent, Interplanetary trajectories, Ions, Ionosphere, Atmosphere, Earth, Thermal radiation, Density, Sun, Ultraviolet radiation, Cosmic rays, Weightlessness, Muscles, Vibration, X rays, Bone marrow, Rockets, Geophysics, Interferometers, Plasma physics, Magnetic fields.

Contents: Motion in a central field under the influence of constant tangential acceleration; class of trajectories of the bounded 3-body problem; spheres of influence of the major planets and the moon; solution of the 3-dimensional problem of heliocentric interplanetary flight with a constant-power engine using the method of quickest descent; formation of ions in the ionosphere; thermal emission of a spherical atmosphere; correlation between results of observing the earth's thermal radiation as a function of the properties of the instrument used; density of upper atmosphere during years of minimum solar activity; measurement of atmospheric density at 50- to 70-km altitude; image of the sun in the distant UV; distribution of cosmic-ray intensity in the atmosphere up to 500 km; measurement of east-west asymmetry in the intensity of primary cosmic radiation; influence of prolonged weightlessness on automatism of cardiac muscle; effect of LF vibration and X-rays on mammalian bone-marrow cells; N(h)-profiles obtained with the VHF dispersion interferometer during 1962-63 rocket landings of the USSR Academy of Sciences; interaction of streams of rarefied plasma with magnetic fields of objects in space.

AD-610 107 Div. 2, 30
OTS Prices: HC $3.00/MF $0.75

Texas A. and M. Univ., College Station.
A WET-AND DRY-BULB TEMPERATURE MEASURING SYSTEM FOR MICROMETEOROLOGICAL APPLICATION.
Final rept.,

by William H. Clayton, B. Jesse Eckelkamp, and Joe H. Machetta. Sep 64, 61p TAMU Ref-64-14F
Contracts AF19 628 2411, DA36 039AMC02195E,
Projs. 7655, 340, Task 765501
AFCRL 64 938

Unclassified report

Descriptors: (*Micrometeorology, Instrumentation), (*Humidity, Measurement), (*Meteorological instruments, Thermocoupler), (*Thermocouples, Meteorological instruments), Moisture, Atmosphere, Determination, Temperature sensitive elements, Thermometers, Containers, Design.

This report reviews the construction of a wet- and dry-bulb temperature measuring system based on a prototype developed for use on Project Green Glow under Contract Number AF 19(604)-4562. Condensed descriptive and schematic representation of the developed system in the engineering as well as the meteorological sense is included. Field testing procedures are thoroughly described, but because of bulk the test data have been summarized. The system will provide wet-bulb depression to within .25C, in digital form, at five-second intervals for depression magnitudes in excess of 15C. Fow lower depression rates the resolution is less than .1C at the five-second sampling rate. Resolution for averaged intervals of the order of five minutes or greater is within .05C for depression magnitudes below 15C, excepting saturation conditions for which no evaluation can be given inasmuch as such conditions were not met at the field testing site during the contract interval. All of the preceding resolution evaluations are applicable under any and all natural conditions of radiation and wind. (Author)

AD-610 110 Div. 2
OTS Prices: HC $2.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
DETERMINATION OF THE IONOSPHERIC ELECTRON CONTENT UTILIZING SATELLITE SIGNALS.
Technical rept.,
by P. R. Arendt, A. Papayoanou, and H. Soicher.
Sep 64, 33p ECOM-2515
Proj. 1C014501B31A, Task 1C014501B31A00

Unclassified report

Descriptors: (*Electron density, Ionosphere), (*Ionosphere, Electron density), (*Atmospheric sounding, Electron density), Satellites (Artificial), Radio signals, Ionospheric propagation, Doppler effect, Magneto-optic effect, Communication systems.

Propagation effects upon radio signals emitted by earth satellites lead to various methods for measuring ionospheric electron content. The total subsatellite content is obtained by measurements of the satellite itself (active method obtaining and integrating profiles from topside sounding) or through observations at the ground of satellite c-w transmissions (passive methods using Doppler or Faraday effect, or both simultaneously). Efforts are made to compare data from active and passive methods. The topside-sounder profile data, combined with appropriate bottomside data, yield complete electron-density profiles that, when integrated, can be compared with electron-content data from passive methods. However, a direct comparison is possible only when active and passive observations can be made simultaneously. Such coincidence of the positions of two satellites is a rare case. Therefore, corrections have to be applied for different times of data-taking as related to diurnal, seasonal, or solar-cycle variations. Other discrepancies have been found that are related to the fact that topside and bottomside profiles sometimes do not match at F2 maximum.

AD-610 113 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
VERIFICATION OF FORECASTS OF MONTHLY PRECIPITATION ANOMALIES BY THE VITEL'S METHOD,
by N. L. Spitsyana. May 64, 21p
AmMetSoc-T-R-440
Contract AF19 628 3880
TT 65 60824

Unclassified report

Rezul'taty Proverki Prognozov Mesiachnykh Anomalii Osadkov po Metodu L. A. Vitel'sa, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR) 1963, no. 148(210) p. 77-89.

Descriptors: (*Atmospheric precipitation, Mathematical prediction), (*Weather forecasting, Atmospheric precipitation), Reliability, Meteorological parameters, Europe, Analysis.

Data are given on the reliability of forecasting monthly precipitation anomalies by the L. A. Vitel's method. Analysis of data for a seven-year period has shown that the method has better than random reliability. Months and regions are cited for which the best results were obtained. (Author)

AD-610 115 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
STUDY OF THE INFLUENCE OF MAGNESIUM ANTIMONIDE ON THE FORMATION OF ICE PARTICLES IN A SUPERCOOLED FOG,
by N. F. Gol'tiakov and P. N. Krasikov. Mar 64,
13p AmMetSoc-T-R-430
Contract AF19 628 3880
TT 65 60826

Unclassified report

Issledovanie Vliyaniya Antimonida Magniya na Obrazovanie Ledyanykh Chastits v Pereokhlazhdennom Vodnom Tumane, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR) 1958, no. 82(144) p. 36-40.

Descriptors: (*Artificial precipitation, Crystallization), (*Fog, Artificial precipitation), Water, Ice, Clouds, Magnesium alloys, Antimony alloys, Temperature, Epitaxial growth, Crystal lattices, USSR.

Laboratory experiments to test Mg3Sb2 as a reagent of crystallization of water have shown that when this substance sublimes in a supercooled fog, the upper temperature limit for the occurrence of the ice phase is about -10 to -11C. The temperature limit increases to -8 or -9C when Mg3Sb2 in aqueous suspension is sprayed into the fog. Hence, Mg3Sb2 is, basically, an effective reagent for crystallizing a supercooled fog. However, there are some practical difficulties involved in employing this substance, e.g.: the instability of the substance and the difficulty ot producing and dispersing it.

AD-610 116 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
EXPLANATION OF THE COLOR OF MARS BY THE SPECTRAL PROPERTIES OF ITS ATMOSPHERE,
by N. A. Kozyrev. Mar 64, 12p AmMetSoc-T-R-428

Contract AF19 628 3880
TT 65 60827

Unclassified report

Ob''yasnenie Tsveta Marsa Spektral'nymi Svoistvami Ego Atmosfery, trans. of Akademiya Nauk SSSR. Krymskaya Astrofizicheskaya Observatoriya. Izvestiya, 1955, v. 15, p. 147-152.

Descriptors: (*Mars, Optical properties), (*Planetary atmospheres, Mars), Planets, Colors, Albedo (Astronomy), Spectra (Infrared), Spectra (Visible and ultraviolet), Astrophysics, USSR.

In the summer of 1954, the 50-inch reflector of the Crimean Astrophysical Observatory was used to obtain spectrograms of Mars, which allowed photometric comparison between the spectra of the surface details of Mars and the solar spectrum. The curves obtained show that the continent and seas of Mars have the same natural color. The observed color difference is due solely to the properties of the Martian atmosphere. Consequently, the albedo of Mars can be determined for different wavelengths. Apparently, the surface of Mars has a natural albedo of approximately 0.45, without any real difference in the visible spectrum, but the large atmospheric dust content in itself causes this neutral surface to appear bright red. The dependence of the optical thickness of Mars on the wavelength, calculated according to this hypothesis is shown.

AD-610 119 Div. 2
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
STRUCTURE OF THE SURFACE BOUNDARY LAYER UNDER CONDITIONS OF TURBULENCE,
by S. S. Zilitinkevich. Mar 64, 13p
AmMetSoc-T-R-437
Contract AF19 628 3880
TT 65 60829

Unclassified report

Stroenie Prizemnogo Sloya Atmosfery pri Nestatsionarnykh Usloviyakh, trans. of Meteorologiya i Gidrologiya (USSR) 1963, no. 1, p. 31-37.

Descriptors: (*Micrometeorology, Atmospheric motion), (*Atmospheric motion, Micrometeorology), (*Turbulent boundary layer, Micrometeorology), Earth, Atmosphere, Surface area, Boundary layer, Wind, Velocity, Temperature, Humidity, Boundary value problems, Meteorology, USSR.

Turbulence as the basic factor which determines the vertical distribution of a number of meteorological elements in the surface boundary layer of the atmosphere is examined The relation of the profile of such factors as wind speed, temperature, and specific humidity to the height variation of the turbulent transfer coefficient is also considered.

AD-610 126 Div. 2, 25
OTS Prices: HC $6.00/MF $1.50

Massachusetts Inst. of Tech., Cambridge. Dept. of Geology and Geophysics.
OBSERVATIONS OF LIGHT SCATTERING IN SEA WATER.
Doctoral thesis,
by Athelstan Frederick Spilhaus, Jr. Feb 65, 243p
Contract Nonr184174, Proj. NR083 157

Unclassified report

Descriptors: (*Sea water, Light transmission), (*Light transmission, Sea water), (*Oceanology, Optics), (*Optics, Sea water), Marine geophysics, Lasers, Light, Electromagnetic waves, Scattering, Atlantic Ocean, Optical properties, Particle size, Functions, Oceanographic data, Tables.

Combination of theoretical curves of the volume scattering function for several different monodisperse systems of Mie scatterers shows that in a polydisperse system the total scattering coefficient is determined by the scattering at small angles to the direction of the incident beam. These combined curves also show that as the particle sizes increase the rise in the volume scattering function at small angles increases. Using a laser as the light source, forward scattering measurements were made to obtain relative total scattering. A continuous track was made between Woods Hole and Port Lewis, Mauritius. In the proximity of land twofold fluctuations of the scattering in a range approximately three times higher than the nearly constant values found in mid-Atlantic were observed. Some fluctuations of the open sea values in the Atlantic were associated with thermal changes.

AD-610 127 Div. 2
OTS Prices: HC $5.00/MF $1.00

Oslo Univ. (Norway). Inst. of Theoretical Meteorology.
STUDIES IN NUMERICAL WEATHER PREDICTION AND THE DYNAMICS OF FRONTS.
Final rept.,
ed. by Arnt Eliassen. Aug 64, 175p
Contract AF61 052 525
AFCRL 64 1014

Unclassified report

See also AD-603 042.

Descriptors: (*Weather forecasting, Mathematical predictions), (*Air mass analysis, Numerical methods and procedures), Atmosphere models, Mathematical models, Wind, Orogeny, Partial differential equations, Iterative methods, Meteorological parameters, Mathematical prediction.

The prognostic equations in primitive form for a mathematical model atmosphere, employing two material surfaces, are given. The equations are written in finite difference form, using a generalization of the 'improved Euler-Cauchy method' for ordinary differential equations to partial differential equations. The balance equation is solved to obtain initial winds, by an iteration method which under certain circumstances may not converge, according to Arnason. A way of restoring convergence is proposed. Results of 12 and 24 hour predictions for the two-level model are presented for three cases: with geostrophic initial winds, with balanced initial winds, and with balanced initial winds and orography. The performance of the model is not bad for the first 12 hours, but deteriorates later, probably because of the development of considerable undulations and slope of the upper material surface. This indicates that a redefinition of the upper surface should be made at least after 12 hours. (Author)

AD-610 152 Div. 2, 1
OTS Prices: HC $5.00/MF $1.00

Raven Industries, Inc., Sioux Falls, Dak.
SKYHOOK CHURCHILL 1964.
Final rept.,
by G. W. Fendrich. 31 Dec 64, 162p Raven-2164
Contract Nonr339012

Unclassified report

See also AD-421 823.

Descriptors: (*Meteorological balloons, Flight testing), (*Atmospheric sounding, Meteorological balloons), Balloons, Launching, Ground support equipment, Payload, Weight, Flight paths, Landings, Recovery, Meteorology, Scientific research, Test facilities, Canada.

A series of high altitude SKYHOOK balloon flights from Ft. Churchill, Manitoba, Canada is discussed. The task called for furnishing personnel and facilities necessary to conduct flights during the period of mid-June to mid-August and included: (1) Fabrication and supply of balloons and balloon safety, destruct, and flight control instrumentation. (2) Performance of necessary launching, aircraft tracking and recovery operations for each flight. (3) Establishment and maintenance of close liaison with the scientific investigators, base officials, and Canadian authorities. (4) Provision of advice and assistance, as necessary, to the scientific experimenters responsible for the payloads. The background of the selection of Ft. Churchill as launch site and a description of present facilities are covered in the Introduction. (Section I). A description of the program, including launch procedures, tracking and recovery techniques, and a description of the flight control instrumentation are covered. An analysis of the 1964 program is presented along with flight data. A total of 32 balloons were inflated during the period of 16 June 1964 to 17 August 1964. (Author)

AD-610 154 Div. 2, 12, 20, 25, 30
OTS Prices: HC $4.00/MF $0.75

American Science and Engineering, Inc., Cambridge, Mass.
A PROGRAM OF RESEARCH FOR THE MEASUREMENT OF COSMIC X-RAYS FROM ROCKET-BORNE INSTRUMENTATION.
Final rept. for 25 May 62-15 Apr 64,
by Riccardo Giacconi, Herbert Gursky, and Thomas G. Quinn, Jr. 28 Oct 64, 104p ASE-758
Contract AF19 628 1605, Proj. 7698, Task 769804
AFCRL 64 888

Unclassified report

Descriptors: (*Cosmic rays, Space probes), (*X rays, Cosmic rays), (*Moon, X rays), Measurement, Photoelectric effect, Alkali metal compounds, Halides, Galaxies, Night sky, Radiation measurement systems, Solar radiation, Scintellation counters, Geiger counters, Sounding rockets, Astrophysics, Instrumentation.

Rocket experiments were flown during October 1962 and June 1963 that confirmed the existence of substantial fluxes of soft X-rays in the night sky apparently of galactic origin. There is evidence for more than one distinct source as well as for a background of X-rays. The X-ray detectors used in these experiments consisted of Geiger counters sensitive in the 2 to 8 angstrom range and scintillation counters sensitive in the 0.1 to 1 angstrom range. An additional rocket payload was developed to measure X-ray emission from the Moon extending to 44 angstrom. This payload involved a novel detection scheme that made use of the external photo effect on alkali halide surfaces. (Author)

AD-610 199 Div. 2, 6
OTS Prices: HC $1.00/MF $0.50

Minnesota Univ., Minneapolis.
TABULATION OF SEISMIC ARRIVAL TIMES AND CROSSSPREAD TIMES, SKULL CLIFF, ALASKA, 1963.
Technical rept. no. 3, 12 Oct-12 Nov 63,
by Thomas Fitch. Oct 64, 15p
Contract Nonr71044

Unclassified report

Descriptors: (*Seismology, Arctic Ocean), (*Arctic Ocean, Seismology), (*Ocean bottom topography, Arctic Ocean), Seismic waves, Seismological stations, Alaska, Hydrophones, Tables, Oceanology, Earth, Surface properties, Seismographs, Instrumentation.

This report presents a tabulation of arrival and cross-spread times for seismic records obtained by the University of Minnesota at Skull Cliff, Alaska, during the fall of 1963. The data were obtained during the course of a cooperative seismic refraction investigation of the Arctic Ocean Basin and the continental slope north from Barrow, Alaska. Shooting was directed by the University of Wisconsin. At Skull Cliff the University of Minnesota operated a geophone array and the University of Wisconsin operated a hydrophone station plus a 3 component geophone group. The University of Wisconsin also operated geophone arrays at Barrow and Carol Lake. Lamont Geological Observatory maintained a geophone and hydrophone station on the ice breaker North Wind. The purpose of this report is to make available the basic data obtained from the University of Minnesota records, together with auxiliary information on instrumentation and receiver location. (Author)

AD-610 220 Div. 2
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
SOLAR X RAYS FROM 3 TO 12 ANGSTROMS AS MEASURED WITH A PROPORTIONAL COUNTER SPECTROMETER.
Environmental Research Papers,
by James E. Manson. Nov 64, 43p AFCRL-64-932, AFCRL-ERP-68
Proj. 6688

Unclassified report

Descriptors: (*Solar radiation, X rays), (*X rays, Solar radiation), Bremsstrahlung, Solar spectrum, Spectrum analyzers, Proportional counters, Design, Calibration, Absorption, Atmosphere, Atmospheric sounding, Sounding rockets, Pulse height analyzers, Upper atmosphere.

A sealed proportional counter with a 1.1 mg/sq cm window was used with a five-step integral pulse-height analyzer to measure the x-ray flux from the quiet sun. The instrument was flown on an Aerobee sounding rocket from White Sands Missile Range, New Mexico, on 25 October 1962 and 2 May 1963. A description of the construction and calibration of the equipment is given, and a detailed discussion of the interpretation of the data is presented. The resulting spectrum, if interpreted as a bremsstrahlung continuum, is characterized by a 3.5 million degree electron temperature, and has an intensity at earth distance of .00012 erg /sq cm sec shorter than 8 A, and .0025 erg/sq cm sec between 8 and 20 A. (Author)

AD-610 224 Div. 2
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A THEORETICAL STUDY OF THE SHOCK WAVE ORIGIN OF SHATTER CONES.
Master's thesis,
by George Peter Johnson and Richard Joseph Talbot.
Aug 64, 103p GSF/Mech-64-35

Unclassified report

Descriptors: (*Rock (Geology), Shock waves), (*Petrology, Shock waves), (*Shock waves, Rock (Geology)), Theory, Underground explosions,

Meteorites, Volcanoes, Fracture (Mechanics), Density, Compressive properties, Stresses, Geometric forms.

Shatter cones are striated, conical structures usually found in fine-grained, homogeneous rocks. The investigation resulted in the development of a theory which predicts that conical fracture surfaces will be produced as the result of the interaction of a shock wave with a small obstacle. The obstacle is a region of anomalous density and/or compressibility in the transmitting medium. The shock wave must have the property that the amplitude of the compressive stress at and behind the front must be equal to the yield strength of the transmitting medium. A theoretical derivation of the stress distribution which results from the interaction of the shock wave and the obstacle demonstrated that a conical fracture surface should be produced. This fracture surface is shown to be an almost perfect pair of cones whose axis of symmetry is parallel to the direction of propagation of the shock wave. At a distance of several obstacle radii, the flanks of the cones are inclined at an angle of 45 degrees to the axis of revolution. This result is independent of the composition of the transmitting medium or the obstacle. There is reason for believing that the cone whose apex points in the direction of shock propagation will be smaller that its companion which points toward the source and in some cases may not exist at all.

AD-610 226 Div. 2, 13
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EXPLOITATION OF LUNAR WATER RESOURCES.
Master's thesis,
by Michael Vincent Vasilik. Aug 64, 83p
GSF/Mech-64-41

Unclassified report

Descriptors: (*Water supplies, Lunar environment), (*Lunar environment, Water supplies), Feasibility studies, Gravity, Vortices, Water, Separation, Evaporators, Condensers (Liquefiers), Electrolysis, Solar furnaces, Well logging, Moon, Surfaces, Geophysic prospecting.

This thesis discusses the technical feasibility of exploiting natural lunar water resources. Brief consideration is given to utility, possible abundances, and location of hydrous deposits. The criteria for design of new equipment or adaptation of existing equipment are specified. Based on these criteria, various proposed designs of extraction, electrolysis, and liquefaction equipment are evaluated. Particular emphasis is given to the effects of reduced lunar gravity on operation and design. Extraction equipment under discussion includes separators, evaporators, condensers, compressors, and pumps. Rotating, vortex, membrane, vapor, and porous electrode electrolysis cells are considered. A rotating cell with a palladium cathode appears to be the most promising. For liquefaction of oxygen and hydrogen, engine expansion is found to be preferable to Joule-Thomson expansion. (Author)

AD-610 253 Div. 2, 30
OTS Prices: HC $2.00/MF $0.50

Kiruna Geophysical Observatory (Sweden).
BALLOON-BORNE MEASUREMENTS OF SOLAR IONIZING RADIATION.
Annual summary rept. no. 1, 1 Jul 62-30 Jun 64,
by W. Riedler. 31 Aug 64, 41p
Contract AF61 052 604
AFCRL 64 868

Unclassified report

Descriptors: (*Solar radiation, Radiation measurement systems), (*Radiation measurement systems, Balloons), (*Balloons, Radiation measurement systems), Airborne, Geiger counters, Cosmic ray telescopes, Scintillation counters, Photometers, X rays, Charged particles, Measurement, Geophysics, Test facilities, Sweden.

The preliminary results of 22 balloon flights, performed in Northern Scandinavia, are presented in diagram form. No detailed discussion is given, however. The instruments flown were Geiger-Muller single counters and telescopes, scintillation counters and photometers. One balloon was flown simultanously with a Nike-Apache rocket including auroral particle and light measurements. The difficulties met using different balloon types are shortly described. (Author)

AD-610 263 Div. 2, 24
OTS Prices: HC $2.00/MF $0.50

Autometric Facility, Raytheon Co., Alexandria, Va.
ZENITH CAMERA DATA REDUCTION PROGRAM. MERRITT'S MODIFIED DEPENDENCES, A RESEARCH STUDY CONCERNING AN ENHANCED VERSION OF THE METHOD OF MODIFIED DEPENDENCES.
Final rept., vol. 2,
by Howard Garcia, E. L. Merritt, and Herbert Chapple.
Dec 64, 36p
Contract AF30 602 3338, Proj. 040A
RADC TDR64 391 V2

Unclassified report

Descriptors: (*Photogrammetry, Numerical methods and procedures), (*Celestial navigation, Photogrammetry), (*Cameras, Photogrammetry), Astronomical geodesics, Photographic techniques, Position finding, Mathematical models, Data processing systems.

A primarily analytical study of a developmental data reduction procedure for camera orientation is presented. The method described in this section is an effort to render the known method of Modified Dependences more rigorous, and to derive the secondary advantages pertaining to the determination of camera constants and the coordinates of an unknown body. A numerical model providing the results of the described procedure and the Tangential Method covered in the first section of the project report is also presented. The numerical model is based upon a data obtained from a RADC Zenith Camera plate processed by the Autometric Operation. (Author)

AD-610 297 Div. 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SEISMICITY OF FAR EAST FOR THE YEAR 1961,
by L. D. Poplavskaya, L. F. Volkova, and F. D. Zhuk. 11 Jan 65, 12p FDT-TT-64-674
TT 65 61009

Unclassified report

Unedited rough draft trans. of Geologiya i Geofizika (USSR) 1963, no. 11, p. 106-114.

Descriptors: (*Seismology, Far East), (*Earthquakes, Far East), Instrumentation, Geophysics, Data, Tables, Reviews, USSR.

Instrumental and macroseismic data of earthquakes in the Far East for the year 1961 are announced. The methods applied for the determination of nidus coordinates and moments of origination of earthquakes are

enumerated and examples of their utilization are given. The energy condition of the zone for the year is compared with conditions of previous years. This review appears to be the result of investigations in comparing the bulletins of the network of seismic stations of the Far East. Such reviews are prepared annually for a majority of seismic zones and they systematize the observation data of seismic stations and further considerably facilitate the use of these materials, especially a study of the changes in seismic condition in space and in time. (Author)

AD-610 301 Div. 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE THEORY OF FORMATION OF SHOCK WAVES IN THE CHROMOSPHERE AND IN THE CORONA,
by S. A. Kaplan and L. A. Ostrovskii. 6 Jan 65, 10p
FTD-TT-64-839
TT 65 61013

Unclassified report

Unedited rough draft trans. of Solnechnye Dannye (USSR) 1963, no. 6, p. 53-59.

Descriptors: (*Shock waves, Solar atmosphere), (*Solar atmosphere, Shock waves), Gases, Heating, Acoustics, Energy conversion, Astrophysics, USSR.

A hypothesis, the so-called 'acoustic theory', explaining the heating of the chromosphere and corona is examined. According to this hypothesis the mechanism of heating consists in the following: audio or magneto waves, originating in the sub-photospheric layers during convective movements, propagate upwards and at a certain altitude transform into shock waves, which lead to a sharp dissociation of same (dissipation of same). The thermal energy liberated there heats the gas of the chromosphere and corona to a high temperature, because the gas density is low. To analyze this theory it is necessary to take into consideration the conditions of transformation of audio waves into shock waves in a heterogeneous atmosphere, situated in a gravitational field, which is connected with definite mathematical difficulties. A method developed in recent years and applicable to the given problem is described.

3. Chemical Warfare Equipment and Materials

AD-609 917 Div. 3, 16, 18
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROTECTING THE POPULATION FROM BACTERIOLOGICAL WARFARE WEAPONS,
by I. Bezdenezhnykh and E. Tyrkova. 7 Jan 65, 50p
FTD TT64 29; TT 65 60702

Unclassified report

Unedited rough draft trans. of mono. Zashchita Naseleniya ot Bakteriologicheskogo Oruzhiya, Moscow, 1963, 48p.

Descriptors: (*Biological warfare, Civil defense systems), (*Civil defense systems, Biological warfare), Biological warfare agents, Civilian personnel, Bacteria, Pathology, Insects, Rodents, Infectious diseases, Toxins and antitoxins, Bacterial aerosols, Immunity, Immune serums, Antibiotics, Germicides, Chemotherapeutic agents, Sanitary engineering, Biological contamination, Decontamination, Shelters, Food, Protective clothing, Warning systems.

This Soviet report discusses the life-destroying power possessed by bacteriologic weapons. Lethal effects are described in popular terms in the booklet which is aimed at a broad section of the reading public. Particular attention is paid to the means and ways of protecting the civilian population in case of a bacteriologic attack.

AD-610 097 Div. 3, 23
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
ANALYSIS OF GAS IDENTIFICATION TRAINING SETS OF THE E17 SERIES.
Final rept.,
by G. H. Fielding and A. Stamulis. 21 Dec 64, 22p
Proj. SF001 08 01 3332
NRL 6185

Unclassified report

Descriptors: (*Chemical warfare agents, Identification), (*Military training, Chemical warfare agents), G agents, Mustard agents, Vagents, Mixtures, Carbon, Water, Absorption (Physical), Silicone plastics, Halocarbon plastics, Fluorine compounds, Safety, Stability.

The Gas Identification Training Set (GITS), currently under Army development for all-service chemical warfare training uses, has been studied for performance and contents. Of the three major groups of modern CW agents, the agent representation of two groups, mustard gas and a G agent, were found to be insufficiently stable to hydrolysis. There is no representative of the very important V group of agents in the GITS. Most of the obsolete or obsolescent CW agents incluued in the GITS are adequately stable. Two mechanisms are postulated to account for hydrolytic instability of the CW agents with the sorbents used by the GITS. One is cosorption of agent and water on sorbents of large specific area, e.g., activated carbon. The other is cosolution of agent and water in elastomers or plastics capable of dissolving appreciable amounts of water, e.g., crepe rubber. To defeat both instability mechanisms, mixing or dissolving CW agents in plastics which absorb very little water is recommended. Examples of these are silicon-containing or fluorine-containing organic polymers. For maximum realism, the recommended agent contents of the GITS is one agent each of the G, V, and H groups, plus G/V, G/H, and H/V mixtures. (Author)

AD-610 128 Div. 3, 10
OTS Prices: HC $1.00/MF $0.50

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
FIELD CALORIMETRY/CHEMICAL STUDIES.
Quarterly technical rept. no. 2, 15 Sep-14 Dec 64,
by Earle C. Klaubert. 6 Jan 65, 19p
Contract DA18 035AMC258A, Proj. 1C522301A065;
ARPA Order 535

Unclassified report

Descriptors: (*Fires, Thermodynamics), (*Flamethrower fuels, Combustion), Gels, Solvents, Hydrocarbons, Flames, Spectroscopy, Explosive materials, Burning rate, Optical equipment, Thermocouples, Spectrum analyzers.

The purpose of the program is to develop a methodology by which to define quantitatively the heat flux from fires of flame fuels burning under field conditions. Quantitative work during this period involved indoor flames of hexane and napalm test solvent in diameters of 11, 18, and 22 1/2 inches. Energy emitted in the visible region was compared with total radiant emission. Preliminary heat balances were conducted on the larger two sizes of flames each with the two fuels; very good agreement was achieved. Heat balances also were made on fires subjected to artificial low-velocity 'winds', and spectra and burning rate were measured for gelled test solvent. The first lots of gelled fuel were prepared, and preliminary tests of the proposed explosive dissemination technique were conducted. Weather conditions prevented quantitative measurements on large outdoor fires. A system of foreoptics to provide either thermopile or spectrometer with a narrow field of view has been designed and is being fabricated. Difficulties resulting from fluctuations in flames, and the need for evaluating fuels under steady-state conditions by measuring heat release rates are discussed. (Author)

4. Chemistry

AD-609 904 Div. 4, 15
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE NUMERICAL SOLUTION OF THE CHEMICAL EQUILIBRIUM PROBLEM,
by R. J. Clasen. Jan 65, 88p RM-4345-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Chemical equilibrium, Mathematical analysis), Linear programming, Mathematical models, Programming (Computers), Programming languages.

In physical chemistry, the 'chemical equilibrium problem' is the problem of determining the distribution of chemical species that minimizes the free energy of a system while conserving the mass of each of the chemical elements. The reactions occurring within the chemical system may be quite complex. However, in a great number of cases, the mathematical statement of the problem can be simplified to a particular mathematical form (AD-605 316 and Dantzig and DeHaven, J. Chem. Phys. 36:2620-2627 (1962)) involving the minimization of a nonlinear objective function over a set of linear constraints. This Memorandum presents the numerical solution of the chemical equilibrium problem by describing methods for starting the solution when an initial estimate is not available, and for improving an initial estimate to make it feasible. It presents a first-order method and a second-order method for solving the chemical equilibrium problem in the context of the linear-logarithmic programming problem (AD-407 547) and provides convergence criteria for the majority of problems of this type that are likely to be attempted. (Author)

AD-609 959 Div. 4
OTS Prices: HC $2.00/MF $0.50

Tracor, Inc., Austin, Tex.
ELECTROCHEMICAL STUDIES IN THE SYNTHESIS OF N-F COMPOUNDS.
Quarterly status rept. no. 7, 1 Jul-30 Sep 64,
by Larry G. Spears, Larry D. Fiel, Wallace E. Harrell, Jr., and Margaret H. Northrup. 8 Jan 65, 29p
TRACOR-65-103-U
Contract Nonr405400, Proj. RR001 06 02,
ARPA Order 399

Unclassified report

See also AD-608 222.

Descriptors: (*Ammonium compounds, Fluorination), (*Nitrogen compounds, Fluorides), (*Fluorides, Synthesis (Chemistry)), Electrochemistry, Electrodes, Materials, Nickel alloys, Molybdenum alloys, Copper alloys, Cadmium, Zinc, Corrosion, Hydrogen compounds, Infrared spectroscopy, Spectrum analyzers, Oxidizers.

Work was devoted primarily to studying the electrode reactions that occur on Monel electrodes during the electrochemical fluorination of ammonium ion in anhydrous hydrogen fluoride (AHF) and to investigating possible new electrode materials. Film resistance and cathodic stripping measurements were performed on Monel electrodes. Weight loss measurements, at open circuit and at a constant anodic potential, and anodic polarization studies were performed on Hastelloy-F, cadmium, and zinc electrodes in AHF. Both cadmium and zinc corroded rapidly in AHF, but Hastelloy-F exhibited an extremely low corrosion rate. Several types of liquid and gas IR cells have been investigated. Calibration IR spectra were made to determine their lower limits of detection for NF3(g). (Author)

AD-609 962 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Wayne State Univ., Detroit, Mich.
A GENERALIZATION OF THE DEBYE LIGHT SCATTERING EQUATION.
Technical rept. no. 12 (58),
by Wilfried Heller. 3 Dec 64, 7p
Contract Nonr351100, Proj. NR051 380

Unclassified report

Descriptors: (*Polymers, Optical properties), (*Light, Scattering), Solutions, Molecular properties, Equations.

The Debye light scattering equation is generalized by making allowance for the variation of (dn/dc)-and therefore of H-with the concentration of the solute. This should allow one to use it with more concentrated solutions provided light scattering is weak enough (oligomer solutions) so that multiple scattering does not exclude such a procedure. (Author)

AD-609 976 Div. 4, 9, 25
OTS Prices: HC $1.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
THE DETERMINATION OF THE ORDER OF A SIMPLE REACTION.
Interim rept.,
by Egon Krause. Oct 64, 15p
Contract AF33 616 7661, Proj. 7064, Task 7064 01
ARL 64 177

Unclassified report

Descriptors: (*Reaction kinetics, Determination), Chemical reactions, Physical chemistry, Thermochemistry, Kinetic theory, Hypersonic flow, Aerodynamic characteristics, Graphics, Numerical analysis, Differential equations, Integration, Experimental data.

A method is presented whereby the order of a simple reaction may be determined. The rate constant in the rate expression is eliminated by means of the integrated rate expression. In this manner unique relations between the nondimensionalized rate and the reacted fraction are obtained for arbitrary orders. Plots constructed from these relations may be used to determine the order of a reaction when concentration measurements as a function of the reaction time are available. (Author)

AD-609 987 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
SYNTHESIS OF CYCLIC ETHERS FROM 1,5-CYCLOOCTADIENE.
Interim rept.,
by Angelo A. Volpe and William J. Bailey. 28 Oct 64, 16p
Proj. R360FR105 071, Task FR71
NOL TR64 135

Unclassified report

Descriptors: (*Cyclooctane derivatives, Ethers), (*Ethers, Synthesis (Chemistry)), Formates, Acetates, Alcohols, Molecular structure, Chemical analysis, Spectra (Infrared), Polyester plastics.

The diformate of 1,5-dihydroxy-2,6-cyclooctyl oxide was synthesized from 1,5-cyclooctadiene. The dihydroxy compound itself was prepared from the diformate by alkaline hydrolysis and a diacetate derivative of the dihydroxy compound has been synthesized by standard methods. While the diformate and diacetate compounds are of general interest as intermediates for the synthesis

of systems containing a cyclic ether structure, the dihydroxy compound is of particular interest as a monomer for the synthesis of unique polyester type polymers. A mechanism which involves a transannular reaction is postulated for the formation of cyclic ethers from the diene and this mechanism is compared to the standard olefin hydroxylation mechanism with respect to the products one would expect from each reaction sequence. The proof of structure of the compounds synthesized were determined by elemental and infrared analysis. (Author)

AD-610 030 Div. 4, 14
OTS Prices: HC $1.00/MF $0.50

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly progress rept. no. 11, 1 Oct-31 Dec 64,
by L. W. Breed and Richard L. Elliott. 13 Jan 65, 20p
Contract DA23 072ORD1687, Projs. 593 32 002, 2531C
Unclassified report

See also 607 054.

Descriptors: (*Elastomers, Synthesis (Chemistry)), (*Silicone plastics, Synthesis (Chemistry)), (*Organic nitrogen compounds, Elastomers), Heat-resistant plastics, Phenols, Polymers, Viscosity, Silanes, Heterocyclic compounds, Siloxanes.

Methods of synthesis for new siloxazane monomers are described. Condensation of these monomers with bisphenol A produces rubbery, solid polymers with intrinsic viscosities up to 2.7. (Author)

AD-610 038 Div. 4, 30
OTS Prices: HC $1.00/MF $0.50

Institute of Rubber Research, Univ. of Akron, Ohio.
LOW TEMPERATURE POLYMERIZATION STUDIES.
Progress rept. no. 4, 1 Oct-31 Dec 64,
by Maurice Morton. 12 Jan 65, 15p
Contract AF04 611 9694, Proj. 3148
Unclassified report

Descriptors: (*Polymerization, Radiation chemistry), (*Radiation chemistry, Polymerization), (*Low-temperature research, Polymerization), Acrylonitrile polymers, Vinyl plastics, Fluorides, Chlorides, Solvents, Purification, Gamma rays, Halocarbon plastics.

The report contains results on the polymerization or attempted polymerization of the following monomers by gamma radiation at reduced temperatures: acrylonitrile, vinyl fluoride, vinyl chloride, allyl cyanide, chloral, and hexafluoroacetone. Since the last reporting period, work has continued to determine the causes of the erratic rates obtained in the radiation-induced polymerization of acrylonitrile at -74C and 720,000 rads per hour. In addition, the gamma ray initiated polymerization of vinylidene fluoride, vinyl fluoride, vinyl chloride and 3-butene nitrile (allyl cyanide) at -72 to -74C has been examined. New work was also started on the radiation-initiated polymerization of carbonyl compounds. The two monomers thur far studied were chloral and he hexafluoroacetone.

AD-610 077 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Texas Univ., Austin. Dept. of Chemistry.
ENERGY DISSIPATION FROM EXCITED STATES OF POLYATOMIC MOLECULES,
by W. Albert Noyes, Jr. 7 May 64, 23p
Grant AF AFOSR206 63
AFOSR 64 2433
Unclassified report

Partly supported by the National Science Foundation, Washington, D. C. through grants to the Univ. of Rochester, N.Y.

Descriptors: (*Polyatomic molecules, Excitation), (*Atomic energy levels, Emissivity), Spectra (Visible and ultraviolet), Chemical bonds, Atomic orbitals, Electron transitions, Nuclear spins, Photochemistry, Aliphatic compounds, Aromatic compounds, Ketones.

The knowledge of the excited states from which the emission of radiation proceeds, is of fundamental importance for the study of the kinetics of energy dissipation absorbed by molecules. Having postulated mechanisms of energy dissipation for polyatomic molecules (e. g. benzene, biacetyl and acetone) based on the existence of excited states of different multiplicities of spin, the existing, experimental results, in spite of being scarce, seem to confirm the proposed hypotheses. Finally, forecasts are made on the behaviour of the cetene molecule that, when subject to radiations of different wavelengths, originates the radicals CH2 in excited states with different multiplicities of spin. (Author)

AD-610 086 Div. 4
OTS Prices: HC $1.00/MF $0.50

Pennsylvania State Univ., University Park.
LIST OF PUBLICATIONS FROM WORK OF PROJECT NR055-328, INDUCTIVE EFFECTS IN GAS PHASE LEWIS ACID-BASE EQUILIBRIA. THERMODYNAMIC RATE PROPERTIES FOR THE ACID-CATALYZED PROPYLENE-ISOPROPYL ALCOHOL INTERVERSION FINAL REPORT,
by Robert W. Taft. Sep 64, 23p
Contract Nonr65605, Proj. NR055 328
Unclassified report

Descriptors: (*Amines, Acid-base equilibrium), (*Alkenes, Chemical equilibrium), (*Propanols, Chemical equilibrium), Gases, Dissociation, Reaction kinetics, Thermochemistry, Organoboranes, Alcohols.

The applicability of the linear inductive energy relationship to gas-phase reactions was studied in the following series of Lewis acid-base equilibria: RCH2NH2(g) + B(CH3)3(g) reversibly yields RCH2-NH2-B(CH3)3(g), where R = CF3, HCF2, CH2OCH3, (CH2)2OCH3, H, CH3, C2H5, or n-C3H7. The dissociation pressure of the Lewis acid-base complex was measured as a function of temperature, and the pK-A's of the amine series were obtained in aqueous solution at 25C. In order to obtain the thermodynamic rate properties of the propylene-isopropanol interconversion, the rate of hydration of propylene at unit pressure was measured in 35.9-62.2 (wt.)% aqueous perchloric acid at ten degree intervals over the range 20-60C.

AD-610 102 Div. 4, 8, 25
OTS Prices: HC $2.00/MF $0.50

Arizona Univ., Tucson. Dept. of Chemistry.
ELECTRICAL AND MAGNETIC PROPERTIES OF ORGANIC SOLIDS.
Final rept. for Sep 62-Nov 64,
by Gordon Tollin. 27 Nov 64, 40p
Contract AF19 628 414, Proj. 8659, Task 865901
AFCRL 64 989
Unclassified report

Continuation of Contract AF19 604 8475.

Descriptors: (*Semiconductors, Organic materials), (*Anthoxanthin pigments, Physical properties), (*Phenols, Physical properties), Complex compounds, Quinones, Azines, Electrical properties, Magnetic properties, pH, Nuclear magnetic resonance, Absorption spectrum, Nuclear spins, Crystals, Stability, Atomic energy levels, Electron transitions, Photochemistry.

The study of the E.P.R. spectra of the isoalloxazine semiquinones was extended to neutral and basic pH. The data demonstrate that the unpaired spin density distribution of the neutral radical is identical to that of the acid form, thus showing that the proton added to the molecule in going from neutral to acid pH does not interact with the unpaired electron. Flavin-phenol complexes in neutral solution were found to have a 1:1 flavin:phenol ratio, while crystalline complexes obtained from such solutions display a 1:2 ratio. Stability constants of the complexes range roughly from 1 to 250. Neutral complexes are much more stable than acid complexes. Charge transfer does not contribute significantly to the stabilization of the acid complexes. It was found that hydroiodic acid can reduce isoalloxazine derivatives to the semiquinone level. The electrical and magnetic properties of single crystals of 1:1 charge transfer complexes of protonated flavins and phenols were investigated. EPR results indicate that complete electron transfer processes can occur at lattice imperfection sites which are produced either during the crystallization process or by removal of solvent from already-formed crystals. The unpaired spins so produced behave as localized, doublet state, free radicals.

AD-610 108 Div. 4
OTS Prices: HC $3.00/MF $0.50

Tracerlab, Inc., Waltham, Mass.
THE ION EXCHANGE PROPERTIES OF CERIUM (IV) COMPOUNDS.
Final rept. for Nov 63-Nov 64,
by Gregory G. Rocco. 1 Nov 64, 52p
Contract AF19 628 3844, Proj. 4608, Task 460802
AFCRL 64 907

Unclassified report

Descriptors: (*Cerium compounds, Ion exchange), (*Ion exchange, Cerium compounds), (*Inorganic compounds, Ion exchange), Phosphates, Oxides, Preparation, Manufacturing methods, Reaction kinetics, Acids, Bases (Chemistry), Solutions, Ions, Hydrogen, Ammonia, Temperature, Moisture, Tests, Barium, Sodium, Rubidium, Chemical analysis, Chemical properties.

The ion exchange properties of ceric phosphate were investigated including rates of reaction, distribution coefficients of alkali metals, capacity and column behavior of some elements. Ceric oxide was shown to possess anion exchange properties in acid solution and cation exchange properties in basic solution. The two compounds have properties analogous to, but not identical with, zirconium oxide and phosphate. Cesium and barium were successfully separated on a short column of ceric phosphate at room temperature. (Author)

AD-610 194 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Missouri School of Mines and Metallurgy, Rolla.
THE VALENCY OF ALUMINUM IONS AND THE ANODIC DISINTEGRATION OF THE METAL.
Technical rept. no. 11,
by M. E. Straumanis and K. Poush. Jan 65, 19p
Contract Nonr229603

Unclassified report

Supported in part by the Corrosion Research Council.

Descriptors: (*Aluminum, Valence), (*Electrochemistry, Aluminum), Metal films, Decomposition, Electrolytes, Solutions, Anodes (Electrochemical cells), Aluminum compounds, Oxides, Particles, Mercury alloys, Ions, Electrolysis.

The intention of the article is to show that Al goes anodically into solution as Al(3+) (not as a lower valency ion) and that during the electrolysis a partial disintegration of the anodic metal occurs. Disintegration of Al also takes place while reacting with H2O in presence of Hg.

AD-610 216 Div. 4, 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PHOTOCALOMETRIC DETERMINATION OF NIOBIUM,
by Sh. T. Talipov and R. Kh. Dzhiyanbaeva.
17 Dec 64, 9p FTD-TT-64-592
TT 65 60916

Unclassified report

Unedited rough draft trans. of Uzbekskii Khimicheskii Zhurnal (USSR) 1963, v. 7, no. 4, p. 18-22.

Descriptors: (*Niobium, Chemical analysis), Niobium alloys, Ores (Metal sources), Thermochemistry, Phenols, Organic nitrogen compounds, Impurities, USSR.

A method is given for the photocalimetric determination of niobium, with the ai of dioxide -3,4 - phenol - 4 - azobenzine, which perr its the determination of niobium in the presence of signi icant quantities of tungsten, vanadium, nickel, silicon, rare earth materials and elements, aluminum cobalt, chrome, etc. The determination of niobium also does not interfere with the presence of a three-fold surplus of titanium and a five - fold surplus of tantalum. The maximal error does not exceed 4.1%. A method was devised for varifying analytically, artificial mixtures of approximate composition with some alloys and niobium containing ores. (Author)

AD-610 237 Div. 4
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ELECTRICAL CONDUCTANCE, DENSITY, AND VISCOSITY MEASUREMENTS OF AQUEOUS SOLUTIONS OF HYDROXYLAMINE HYDROCHLORIDE AT 25C.
Master's thesis,
by Jimmie J. Nelson and Henry S. Nizko. Aug 62,
67p GAW/Mech-62-15

Unclassified report

Descriptors: (*Amines, Electrical conductance), (*Electrical conductance, Amines), (*Density, Amines), (*Viscosity, Amines), Solutions, Water, Electrolytes, Salts, Chlorides.

The investigation determined the electrical conductance, density and viscosity of aqueous solutions of hydroxylamine hydrochloride at 25C. A comparison of the experimental results with those obtained by using a theoretical equation developed by Onsager was made. The electrical conductance measurements were obtained by the use of a Leeds-Northrup Wheatstone Bridge and a Jones Conductance Cell in a constant-temperature bath. Cannon-Fenske-Oswald viscometers in the constant-temperature bath were used to obtain the kinematic viscosities. An

approximately 25 ml calibrated pycnometer was used to measure densities. The electrical conductance measurements for NH2OH.HC1 indicated that equivalent conductance = 153.15 and the slope of the equivalent conductance vs. (C) 1/2 curve in the dilute range (slope = 260.5) was approximately equal to the calculated theoretical value for a 3-1 electrolyte. The density varied linearly with concentration from 0.99707 gm/ml for pure water to 1.0921 gm/ml for a 3.507 molar solution of NH2OH.HC1. The viscosity varied as an approximately straight line with concentration. Corrected values of viscosity ranged from 0.8963 centistokes for pure water to 1.050 centistokes for the 3.507 molar solution.

AD-610 264 Div. 4
OTS Prices: HC $4.00/MF $1.00

Philco Research Labs., Newport Beach, Calif.
PURIFICATION OF ORGANIC COMPOUNDS BY THERMAL DIFFUSION.
Final rept. for 1 Jul 63-1 Jul 64,
by John L. Richardson, Richard J. Getz, and John C. Britt. 15 Sep 64, 127p U-2705
Contract DA18 108AMC243A

Unclassified report

Descriptors: (*Organic compounds, Separation), (*Thermal diffusion, Organic compounds), (*Separation, Thermal diffusion), Purification, Mixtures, Liquids, Distillation, Laboratory equipment, Design.

The study consisted of an extensive review of unpacked and packed thermogravitational column theory, an experimental investigation involving both unpacked and packed columns, and an analysis of the experimental results in relation to theoretical predictions. Improvements in column design and operating procedures were developed in order to facilitate the acquisition of reliable and consistent separation data. The following results were obtained: 1) pure component properties alone cannot predict column performance, 2) separation data for a homologous series can be correlated in terms of property differences with certain restrictions, 3) linear packed column theory is invalid at small permeabilities, 4) characteristic packing size is not an important variable affecting column performance, 5) transient batch packed column performance can be predicted using cell measured binary Soret coefficients, and 6) continuously operated packed column performance is similar to that of the unpacked column in its dependence on the feed flow rate. (Author)

AD-610 265 Div. 4, 7
OTS Prices: HC $3.00/MF $0.50

Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMICAL OXIDATION OF SATURATED HYDROCARBONS.
Interim technical rept. no. 2, 1 May-30 Oct 64,
by A. C. Makrides, S. B. Brummer, and M. Dienst. 30 Oct 64, 52p
Contract DA44 009AMC410T

Unclassified report

Descriptors: (*Electrochemistry, Hydrocarbons), (*Hydrocarbons, Oxidation), (*Fuel cells, Hydrocarbons), Nitrogen, Aliphatic compounds, Phosphoric acids, Electrolytes, Platinum, Electrodes, Absorption.

A study of the behavior under N2 and propane gases, of smooth Pt electrodes in concentrated phosphoric acid electrolytes was carried out. The adsorption of propane on Pt from concentrated H3PO4 at 80C, was studied with anodic and cathodic charging curves. Neither of these by itself was found to give a reliable estimate of the adsorbate concentration, but together they provided an insight into the character of the adsorbed species. Initial adsorption is probably on a single site but substantial further material is adsorbed on 3 sites, except at low potentials. The stoichiometry of this 3 site adsorbate corresponds to direct adsorption of propane. At longer times of adsorption, the propane degrades and is partially oxidized. This adsorbed product releases about two electrons per Pt surface site atom during its oxidation at high potentials. Coverage with this species is high at some potentials, and is potential-dependent. The rate of adsorption is probably controlled by the rate of diffusion of propane to the electrode. Current potential curves for the oxidation of C3H8 on smooth Pt, from 85% H3PO4, at 130C, were also studied. The oxidation rate, at low potentials, is activation-controlled, with a Tafel slope of about 2.3 RT/F. At higher potentials, the oxidation rate is controlled by diffusion of propane.

AD-610 311 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Davies (Edward) Chemical Lab., Univ. Coll. of Wales, Aberystwyth.
INFRA-RED DISPERSION STUDIES. PART 2. METHYL IODIDE.
Scientific rept. no. 11,
by W. H. Prichard and W. J. Orville-Thomas. 27 Sep 64, 22p
Contract AF61 052 691

AFCRL 65 11

Unclassified report

See also AD-418 433.

Descriptors: (*Halogenated hydrocarbons, Spectra (Infrared)), (*Iodides, Spectra (Infrared)), (*Infrared spectroscopy, Halogenated hydrocarbons), Band spectrum, Infrared spectroscopy, Intensity, Chemical bonds, Vibration, Dipole moments, Vapors, Great Britain.

The dispersion curve for liquid methyl iodide was measured between 2 and 20 microns using an interferometric method. The refractive index data were analyzed to yield the infra-red intensities of all fundamental vibration bands. The results were used in conjunction with a reasonable (quadratic) potential function to obtain dipole moment derivatives with respect to bond lengths and 'bond moments'. The parameters obtained are compared with those obtained for methyl iodide in the vapour state. (Author)

5. Communications

AD-609 925 Div. 5, 30
OTS Prices: HC $3.00/MF $0.50

Western Electric Co., Inc., New York. Bell Telephone Labs., Inc.
TEST PROGRAM FOR TROPOSCATTER COMMUNICATION LINKS.
Final rept., phase 1.
4 Dec 64, 52p
Contract DCA12

Unclassified report

Descriptors: (*Troposphere, Radiofrequency interference), (*Data transmission systems, Wave transmission), (*Radio relay systems, Wave transmission), Test facilities, Radio communication systems, Radio signals, Frequency, Signal-to-noise ratio, Scattering, Attenuation, Recording system, Propagation, Bandwidth, Digital computers, Data processing systems, Programming (Computers), Errors, Mathematical models, Probability.

Recommendations for tests of 2.4 and 38.4 kbs data transmission on troposcatter radio relay sections are given. It is recommended that the tests be designed around an error recording facility which records error, synchronizing, and radio signal information in IBM format to allow automatic computer analysis. The recommended data sets are the Bell System four-phase data models. It is suggested that the tests be conducted on the RADC Model City to Verona section or on an ATandT tropo system. Laboratory simulation of field measurements is also suggested. The emphasis throughout is on practical data tests with measurements of the medium relegated to an auxiliary role. A brief review of the recently published studies by Sunde and by Bello and Nelin is included. (Author)

AD-609 933 Div. 5
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
RELIABILITY IMPLEMENTATION IN ONE ELECTRONIC SYSTEM.
Master's thesis,
by Richard E. Worthey. Nov 64, 98p GRE/SM/64-4

Unclassified report

Descriptors: (*Radio equipment, Reliability (Electronics)), (*Communication equipment, Reliability (Electronics)), (*Electronic equipment, Reliability (Electronics)), (*Reliability (Electronics), Radio equipment), Ultrahigh frequency, Airborne, Mathematical models, Test methods, Statistical tests, Radio receivers, Radio transmitters, Power supplies, Control, Radio communication systems, Command and control systems.

The reliability program for the Radio Set AN/ARC-34 is analyzed. The AN/ARC-34 is an airborne ultra high frequency (UHF) command communications set, which can be preset to any 20 of 1750 frequencies between 225.0 and 399.9 megacycles. The factors which resulted in this program being initiated are determined. A failure distribution model and reliability function are derived for each subsystem. The models show that the distribution of failures is exponential. The areas of reliability organizations, reliability reports, and procurement documents are analyzed. An analysis is made of the reliability requirements established by this program with respect to those established by MIL-R-27542. This analysis shows that the present requirements do not insure an operationally reliable system. Recommendations are made for improving the overall reliability program. (Author)

AD-609 946 Div. 5, 28, 30
OTS Prices: HC $3.00/MF $0.75

Montana State Univ., Missoula. Communication Research Lab.
AN EXPERIMENTAL TECHNIQUE FOR THE STUDY OF HUMAN COMMUNICATION.
Technical rept.,
by Forrest L. Brissey. Sep 64, 76p
Grant AF AFOSR62 214
AFOSR 64 2409

Unclassified report

Descriptors: (*Communication systems, Effectiveness), Feedback, Transmitter-receivers, Speech representation, Social communication, Auditory perception, Performance (Human), Performance (Engineering), Auditory signals, Display systems, Control, Statistical analysis, Analysis of variance, Behavior.

Results are reported of empirical studies of conditions assumed to influence the effectiveness of communications systems.

AD-609 978 Div. 5, 30
OTS Prices: HC $4.00/MF $1.00

Electrical Engineering Research Lab., Cornell Univ., Ithaca, N. Y.
ANALYTICAL TECHNIQUES FOR LINEAR TIME-VARYING SYSTEMS.
Technical rept. no. 81,
by N. Liskov. Nov 64, 140p EERL-27
Contract DA36 039AMC00034E

Unclassified report

Descriptors: (*Time-lag theory, Communication systems), (*Communication systems, Linear systems), Signal-to-noise ratio, Control systems, Feedback, Synthesis, Air-to-surface, Communication satellites (Active), Doppler effect, Side-looking radar, Mathematical analysis, Series, Matrix algebra, Sampling.

The definition of several new system functions leads to a more complete characterization of time-varying linear systems. A family of twelve system functions, including the impulse-response K system functions, are used to describe time-varying linear systems. The relationships among the various system functions are clearly illustrated. The K system functions are shown to be convenient for the analysis of cascaded systems. The time-frequency duality concept is discussed with respect to the system functions, and the introduction of physical variables extends the duality concept so that knowing one relationship is equivalent to knowing four relationships. The expansion of system functions in terms of a complete set of functions in two dimensional space or in a sampling series for an appropriately band-limited and/or time-limited system leads to a matrix characterization of time-varying linear systems. Schemes for evaluating the coefficients of the expansions are described.

AD-610 092 Div. 5, 8
OTS Prices: HC $2.00/MF $0.50

Laboratory for Electroscience Research, New York

Univ., N. Y.
FEEDBACK COMMUNICATION SYSTEMS.
Final rept. for 15 Jan 60-14 Oct 64,
by J. J. Metzner, K. C. Morgan, and L. S. Schwartz.
14 Nov 64, 32p
Contract AF19 604 6168, Proj. 4610, Task 461003
AFCRL 64 920

Unclassified report

Descriptors: (*Communication systems, Feedback), Communication theory, Decision making, Radio communication systems, Radio transmission, Data transmission systems, Pulse communication systems, Coding, Signals, Errors, Signal-to-noise ratio, Noise (Radio), Probability, Programming (Computers), Digital systems, Bandwidth, Reliability.

The contents of seventeen scientific reports are described. Most of the work is included in one of three categories: (1) the theory and development of coded error-free feedback communication systems; (2) signal theory, with particular emphasis on application to feedback communications; and (3) evaluations and analyses of communication system performance. Some promising areas for future research are also given. (Author)

AD-610 120 Div. 5, 12
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
ANALYSIS OF DOPPLER DATA FROM ECHO II,
by Edward E. Cossette. Nov 64, 36p
RADC-TDR-64-444
Proj. 4519, Task 451903

Unclassified report

Descriptors: (*Communication satellites (Passive), Doppler effect), (*Doppler effect, Communication satellites (Passive)), Radio communication systems, Phase-locked communication systems, Radar equipment, Doppler systems, Measurement, Experimental data, Analysis, Data, Errors, Orbital trajectories.

It is important to the design engineer to have forehand knowledge of the doppler uncertainties to be expected in a given communication environment. To obtain this knowledge accurate measurement of the doppler frequency must be obtained for comparison with precalculated doppler frequency data. Measurements were made using the Passive Satellite Research Terminal at the Floyd Test Site. Prior to these measurements, orbital element data received from Space track agencies was used to predict the expected doppler frequency as a function of time in an on-site digital computer. The computed doppler frequency was subtracted from the measured doppler frequency every second to obtain the doppler difference. The results of the data revealed that a sizeable time error existed in the computed data. This resulted in much larger doppler uncertainties than expected. (Author)

AD-610 130 Div. 5, 8, 25
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
ELECTROMAGNETIC LIGHT WAVES IN COMMUNICATION ENGINEERING,
by Miroslav Prochazka. 15 Jan 65, 17p
ATD-T-65-2
TT 65 60830

Unclassified report

Svetelne Electromagneticke Vlenenive Sdelovaci Technice, trans. of Slaboproudy Obzor (Czechoslovakia) 1964, v. 25, no. 6, p. 313-318.

Descriptors: (*Communication theory, Light communication systems), (*Light communication systems, Communication theory), (*Electromagnetic waves, Propagation), (*Lasers, Light communication systems), Wave transmission, Light, Modulation, Oscillation, Demodulators, Radio waves, Quantum mechanics, Optics, Electric currents, Signal-to-noise ratio, Atmosphere, Meteorological parameters.

Basic questions related to the use of light waves for transmission of information are treated. The generation of light waves, their modulation, and detection are covered. Main emphasis is placed on the transmission of information in the atmosphere under normal meteorological conditions and by means of light guides. The possibility of using light waves for information transmission in the near future is critically evaluated. (Author)

AD-610 215 Div. 5
OTS Prices: HC $4.00/MF $1.00

Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
SOME USEFUL CODING TECHNIQUES FOR BINARY COMMUNICATION SYSTEMS,
by J. C. Hancock and J. L. Holsinger. 2 Jan 64,
116p PUSEE-TR-EE-62-1
Contract AF33 616 8283, Proj. PRF2906

Unclassified report

Descriptors: (*Coding, Theory), (*Communication systems, Communication theory), Digital systems, Feedback, Data transmission systems, Signal-to-noise ratio, Binary arithmetic.

An introduction to coding theory and a discussion of specific coding techniques are given as applied to digital communication systems. The place of coding in a communication system is illustrated and the various approaches to coding are discussed. The information theory concepts required are presented along with the First and Second Fundamental Theorems of Shannon. The relation between Shannon's theorems and coding for the noisy and noiseless channel is discussed. For the noiseless channel the techniques of Shannon, Fano, Huffman, Gilbert-More, Karp and others are discussed. For the noisy channel the techniques of Hamming, Slepian, Elias, Cowell, Bose-Chaudhuri, Reed-Muller, Fire, and Wozencraft are presented. The relationships between the various codes are given and the advantages and disadvantages of each indicated. Numerous examples illustrating the use of the codes are given and areas of further research outlined. (Author)

6. Detection

AD-610 150 Div. 6
OTS Prices: HC $3.00/MF $0.75

Ling-Temco-Vought, Inc., Dallas, Tex.
EXPERIMENTAL INVESTIGATION OF OPTICAL PRESENTATION OF THREE DIMENSIONAL DISPLAY.
Final rept.,
by Eugene Lankford. 6 Jan 65, 78p LTV-00.567
Contract Nonr443900, Proj. NR196 039
Unclassified report

Descriptors: (*Stereoscopic display systems, Feasibility studies), (*Tracking, Stereoscopic display systems), Optical images, Optical equipment, Cathode ray tubes, Reproduction, Underwater navigation, Mirrors, Light.

The objective of the program was to design and develop two (2) experimental prototypes of a volumetric three-dimensional display utilizing point-light-images generated by cathode ray tubes which are seen by an observer located in the real image field of a parabolic and plane mirror. Various approaches of image combining such as time-sharing and light-sharing were investigated. The investigation resulted in the verification of the feasibility of the 3-D display concept. Both light-sharing and time-sharing of multiple image presentations are possible means of reproducing images in three dimensions. The choice of method is predicated on the specific application. The utilization of three dimensional presentation is restricted only by the quality of the data received for presentation, quality of the optic-electro-mechanical system and functional space. Recommendations for additional investigation as a continuation of this study are: (a) Investigation of vision threshold and fusion frequencies below 5 microsecond regime and (b) Continuation of the development of uses of cathode ray tube image production technique to present 3-D information with time and/or light-sharing methods. (Author)

AD-610 189 Div. 6, 14, 31
OTS Prices: HC $7.55/MF $2.25

Goodrich (B. F.) Aerospace and Defense Products, Akron, Ohio.
PRESSURIZED BOW DOME OF A CABLE-REINFORCED RUBBER CONSTRUCTION FOR USE WITH AN/SQS-26 SONAR.
Interim rept. no. 17, phase 1, 1 Mar 63-30 Apr 64,
by W. J. Berus. 30 Sep 64, 454p
Contract NObsr89483, Proj. SS041 001, Task 8156
Unclassified report

This rept. completes Phase I, Feasibility of the subject contract.

Descriptors: (*Sonar domes, Rubber seals), (*Rubber seals, Sonar domes), (*Acoustic equipment, Rubber seals), Rubber, Sonar equipment, Manufacturing methods, Underwater sound equipment, Antifouling coatings, Pressure vessels, Cables (Mechanical), Reinforcing materials, Ship hulls, Marine engineering, Feasibility studies.

This report summarizes studies of the feasibility of a pressurized, cable-reinforced, rubber acoustic window for a Sonar bow dome. The discussion includes theoretical approaches as well as descriptions of the fabrication and testing of samples. Due to the large size of the rubber acoustic window, tooling is a special problem. This report includes results of the tooling investigation. Several other associated studies were also completed, and the results are presented herein. These include an anti-fouling paint system for the rubber acoustic window, an investigation of methods for transporting the window, and a study of design methods for adapting a universal window to four similar, but not identical, ship's hulls. It was concluded that a rubber acoustic window is entirely feasible and, in fact, superior to an all-steel dome from the standpoint of acoustical performance. The prototype window being designed will mate with either the DL-4, DL-5 or DLG-26 ships. (Author)

AD-610 254 Div. 6, 28
OTS Prices: HC $4.00/MF $0.75

Goodyear Aerospace Corp., Akron, Ohio.
MEASUREMENTS AND MODELS FOR RELATING THE PHYSICAL CHARACTERISTICS OF IMAGES TO TARGET DETECTION.
Final rept. for Jul 62-Sep 63,
by Donald G. Corbett, N. D. Diamantides, and R. H. Kause. Dec 64, 109p
Contract AF33 657 9476
AMRL TR64 117
Unclassified report

Descriptors: (*Target recognition, Performance (Human)), (*Photointerpretation, Radar targets), (*Photointerpreters, Performance tests), (*Mathematical prediction, Target recognition), Aerial reconnaissance, Detection, Tracking, Human engineering, Radar tracking, Optical images, Infrared photography, Scanning, Analog computers, Correlation techniques, Probability.

Three metrics for predicting the time required to identify targets in high-resolution radar pictures were developed. One metric, based on four automatically measured variables related to transmissivity of positive transparencies, was tested. Through multiple-regression analysis, a correlation of 0.69 between observed and predicted identification times was obtained. When these relationships were applied to a new set of radar pictures and new test subjects, the correlation coefficient was too low to be significantly different from zero with the number of pictures used. A principal reason for the low correlation was the unexpected correlation between the four transmissivity variables. The metric also had an insignificant correlation coefficient when applied to optical and infrared photographs (0.07 and 0.04, respectively). It is hypothesized that, if additional variables are utilized, the metric examined in this study may be useful as a base to develop a more effective prediction equation. (Author)

7. Electrical Equipment

AD-609 895 Div. 7
OTS Prices: HC $2.00/MF $0.50

Mallory (P. R.) and Co., Inc., Burlington, Mass.
CELL EQUALIZATION TECHNIQUES.
Quarterly technical progress rept. no. 3, 1 Jul-1 Oct 64,
by F. J. Cocca. Oct 64, 34p
Contract AF33 615 1342, Task 817304 18
AD 607 296 superseded
Unclassified report

Supersedes rept. dated 15 Oct 64.

Descriptors: (*Alkaline cells, Stabilization), (*Batteries and components, Stabilization), Electrolytic cells, Nickel, Cadmium, Voltage regulators, Circuits, Pressure, Diodes, Hermetic seals, Tables.

Hermetically sealed Ni-Cd cells were cycled with and without stabistor charge control. The capacity range used was 5 to 20 ampere-hours. In the four charge control circuits BCC-9, BCC-10, BCC-11 and BCC-12, the stabistors were effective in clamping cell voltages and minimizing gassing. In BCC-11, 20 AH Ni-Cd cells were cycled and the stabistors were effective in preventing internal cell shorting and extending battery life. Some antireversal studies were also conducted. Initial results indicate that antireversal diodes are partially successful in preventing gassing during cell reversal. The data suggest the use of a larger antireversal diode for adequate protection. (Author)

AD-609 966 Div. 7
OTS Prices: HC $2.00/MF $0.50

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW-TEMPERATURE CYLINDRICAL THERMIONIC GENERATOR.
Quarterly technical rept. no. 3.
Dec 64, 50p
Contract AF33 615 1547, Proj. 8173, Task 817305 9
Unclassified report

Continuation of Contract AF33 616 7903.
See also AD-607 086.

Descriptors: (*Thermionic converters, Design), (*Energy conversion, Thermionic converters), Electric power production, Power equipment, Heaters, Liquid metals, Seals (Stoppers), Tests, Life expectancy, Injection, Gases, Materials, Molybdenum, Nickel, Cesium compounds, Fluorides, Sulfates, Tungsten compounds, Oxides, Iridium, Palladium, Niobium, Ceramic materials, Thermal radiation, Aluminum compounds.

The evaluation and analysis of Type A-1198B insulated converters provided additional evidence that the A-1198B is a reliable, long-life design, and that the cast alumina layer is an effective insulator. Four improved Type A-1274A Modules, Serial Numbers 2 through 5, were fabricated. The improved reliability of the module was demonstrated in calibration tests of Module Serial No. 4, when more than 240 hours of operating time was accumulated over a wide range of operating conditions. Tests showed that although the A-1274A is capable of full design performance, additional collector cooling is required. Consequently, the radiation heat rejection system for Module Serial No. 5 was redesigned. Tests with the gas dosing injection system indicated the need for more accurate gas injection, and the system was subsequently modified. Collectors of cesium fluoride, cesium sulphate, tungsten trioxide, iridium matrix, and palladium matrix were tested in Type A-1194E converters in the low-work function collector investigation. Results were unsatisfactory. Data were compiled and analyzed on both molybdenum and niobium high-temperature collectors. The results showed that collectors can be operated as high as 700 C (with an emitter temperature of 1350C) without inordinate loss of power.

AD-609 984 Div. 7, 4
OTS Prices: HC $3.00/MF $0.50

Delco-Remy Div., General Motors Corp., Anderson, Ind.
ZINC ELECTRODE INVESTIGATION.
Quarterly technical progress rept. no 2, 1 Oct 64-1 Jan 65,
by J. J. Lander, J. A. Keralla, and R. S. Bogner.
15 Jan 65, 51p
Contract AF33 615 1583, Proj. 8173, Task 817304
Unclassified report

Descriptors: (*Storage batteries, Electrodes), (*Electrodes, Zinc), (*Zinc, Electrodes), Catalysts, Life cycle, Palladium, Aluminum compounds, Oxides, Hydrogen, Oxygen, Recombination reactions, Impurities, Iron compounds, Manganese compounds, Potassium compounds, Carbonates, Silver, Lead, Containers, Epoxy plastics, Styrene plastics, Electrolytes, Surface-active substances.

Tests utilizing a catalyst indicate that the recombination of gases appears to be chiefly dependent on the quantity of catalyst present. It is apparent that internal cell pressure affects cycle life, i.e., high internal pressure reduces cycle life somewhat and low internal pressure increases life. Certain zinc crystal sizes may be detrimental to cycle life. Additional studies are to be made. The additions of various impurities to the cell, such as FeO, MnO, and K(2)CO(3), do not appear to be detrimental to cycle life of the silver-zinc cell. The use of the surfactant Emulphogene (about 1%) apparently aids in the cycle life of the zinc negative plate. Higher percentages are to be tested. A new plastic styrene-based resin is to be tested in cell cases and covers. (Author)

AD-609 986 Div. 7, 4
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
MORPHOLOGY OF PbO2 IN THE POSITIVE PLATES OF LEAD ACID CELLS.
Interim rept.,
by Jeanne Burbank. 11 Jun 64, 10p
Projs. RR001 01 43 4755, SF013 06 03, Task 4366
NRL 6048
Unclassified report

Descriptors: (*Lead compounds, Storage batteries), (*Storage batteries, Lead compounds), (*Batteries and components, Storage batteries), Electrolytic cells, Anodes (Electrolytic cell), Oxides, Lead alloys, Antimony alloys, Calcium alloys, Sulfuric acid, Crystallography, Electron microscopy, Electrochemistry.

Several preparations of PbO2 including positive active material from lead antimony and lead calcium cells were examined by electron microscopy. The morphology of the particles is believed to have a bearing on positive paste retention and plate performance in the lead acid cell. The anodic coating of PbO2 formed on pure lead sheet in H2SO4 was found to be prismatic when first formed, but lost its prismatic character upon prolong anodization and upon cycling. (Author)

AD-609 988 Div. 7, 17
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
A STUDY OF FACTORS AFFECTING THE CORROSION RATE OF MAGNESIUM IN VARIOUS ELECTROLYTES UNDER STATIC CONDITIONS.
by Carl A. Nordell. Aug 64, 17p
Task 1AO 13001A039 19
ECOM 2517

Unclassified report

Descriptors: (*Primary cells, Magnesium), (*Magnesium, Corrosion), (*Corrosion inhibition, Magnesium), (*Electrolytes, Corrosion), Magnesium alloys, Magnesium compounds, Chlorides, Bromides, Perchlorates, Salts, Solutions, Fatty acids, Silicon coatings, Films, Chemical properties, Surface properties, Gases.

The corrosion rates of magnesium and magnesium alloys in magnesium salt solutions of chloride, bromide, and perchlorate were studied by measuring the gaseous reaction product as a function of time. Reliable apparatus was developed to accurately determine the volumes of gas generated. Protective films were applied to the surface of the magnesium metal to suppress excessive chemical reactivity at the metal-electrolyte interface, thereby reducing static corrosion rates. Cramolin, one of the films tested, reduced the gas evolution of an AZ21 Mg-2N MgBr2 system from 400 cc/800 hrs to 0.1 cc/800 hrs. (Author)

AD-609 999 Div. 7, 4
OTS Prices: HC $2.00/MF $0.50

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY. SUPPLEMENT TO THIN-FILM MONOTRONICS.
Quarterly rept. no. 3, suppl. for 12 Sep-12 Dec 64,
by J. Smit and K. C. Channabasappa. 12 Dec 64, 26p
Contract NOw64 0568d

Unclassified report

See also AD-607 029.

Descriptors: (*Batteries and components, Primary cells), (*Storage batteries, Primary cells), (*Power supplies, Primary cells), (*Ammonia, Batteries and components), Electrical properties, Specifications, Performance (Engineering), Low temperature research, Electrolytes, Salts, Electrodes, Organic compounds, Molecular electronics, Electrochemistry, Containers, Aluminum, Feasibility studies.

This supplement is a progress report of a power-source development program. The purpose of this program is to determine the feasibility of developing a practical high-power output, reserve, primary battery based on a liquid-activated ammonia system. The battery under development will be composed of two 15-cell sections separated by an integrated activator-actuator mechanism and an electrolytic-solution reservoir system. Each section will be capable of developing 75 watts. The two sections will be linked electrically in parallel. The liquid-activated ammonia cell, upon which this program is based, is composed of a light active metal anode, an organic cathode, and an electrolytic solution formed from anhydrous liquid ammonia and salt. Such a cell has the theoretical capability of meeting the power requirements through a wide temperature range. The design and development of the 150-watt ammonia battery unit is being carried out in three phases. In the first phase, the technical feasibility of developing a high-energy density battery, operative over the temperature range of -54C to +74C, using magnesium-NH4SCN-meta dinitrobenzene as the electrochemical system was demonstrated.

AD-610 010 Div. 7
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
STANDARD LINE ALKALINE SECONDARY BATTERIES.
Technical rept.,
by Erminio J. Settembre. Jul 64, 25p
Proj. 1C6 22001A053, Task 1C6 22001A053 02
ECOM 2527

Unclassified report

Descriptors: (*Storage batteries, Design), (*Alkaline cells, Storage batteries), Standardization, Electrodes, Nickel, Cadmium, Silver, Silver compounds, Oxides, Zinc, Containers, Glass textiles, Plastics, Electric connectors, Batteries and components.

The development of a family of secondary batteries based on the design of only 18 sizes of battery boxes will make available for field use 108 units to provide 6-, 12- and 24-volt operation in capacities from 3.5 to 220 ampere hours. These 108 units will be built in three electrochemical systems (the nickel-cadmium, the zinc-silver oxide, and the cadmium-silver oxide) and will be made up of vented or sealed cells which will have been standardized previously. The flexibility and interchangeability to be derived from such a family of batteries will be enhanced further by incorporating in the design capability for operation of one-third of these batteries at 24 or 12 volts and one-third at 12 or 6 volts. The cases will be designed of fiberglas reinforced plastic to withstand severe environmental conditions and to provide operation with or without covers. With the covers removed, coupling directly to using equipment will be possible. Standardization of nickel-cadmium and silver-cadmium cells is being accomplished at present and two of the vented nickel-cadmium batteries are under development. (Author)

AD-610 104 Div. 7, 5
OTS Prices: HC $6.00/MF $1.25

General Electric Co., West Lynn, Mass.
INVESTIGATION OF POWER SOURCES FOR MANPACK EQUIPMENT.
Final technical rept. for 24 Feb-24 Aug 64,
by Thomas C. Hovious. Dec 64, 201p
Contract AF30 602 3356, Proj. 5592, Task 559203
RADC TDR64 412

Unclassified report

Descriptors: (*Power supplies, Portable), (*Energy conversion, Portable), Storage batteries, Power supplies, Fuel cells, Thermionic converters, Motor generators, Ferroelectricity, Thermoelectricity, Generators, Weight, Effectiveness, Communication equipment, Performance (Engineering), Military requirements.

This study was performed to determine the most optimum energy conversion technique for a man-pack power source in the power levels of 10, 25, and 100 watts. These power levels were investigated at two separate energy demand rates of one to nine duty cycle and a one to one duty cycle. The most critical requirements in this effort were weight and volume. The power sources were allowed 4, 15, and 25 pounds respectively and a volume which could be integrated with the communications equipment on a standard military back-pack board. The results of this engineering investigation indicate that batteries of the AgZnO variety appear to be best for all power levels at the one to nine duty cycle. The fuel cells are inherently lighter systems in the 10 and 25 watt design one to one duty cycle but it is not conclusive that they are superior to thermoelectrics in the 100 watt, one to one duty cycle. In the 100 watt size all pertinent criteria must be weighted and evaluated prior to a final choice. (Author)

AD-610 151 Div. 7, 9, 25
OTS Prices: HC $2.00/MF $0.50

Martin Marietta Corp., Baltimore, Md.
RESEARCH PROGRAM ON APPLICATION OF JET COMPRESSOR TO MAGNETOPLASMADYNAMIC ELECTRICAL POWER GENERATION.
Final rept. for 1 Jun 63-30 Nov 64,
by Cheng Shih. Dec 64, 47p MND-3176
Contract Nonr408700, Proj. 2980; ARPA Order 327
Unclassified report

Descriptors: (*Electric power production, Magnetohydrodynamics), (*Magnetohydrodynamics, Generators), (*Axial-flow compressors, Exhaust gases), Mixed-flow compressors, Compressible flow, Jet mixing flow, Power supplies, Helium, Cesium, Niobium alloys, Zirconium alloys, Vapor pressure, Separation, Programming (Computers), Digital computers.

The objectives of this program are twofold: (1) to conduct an analysis and design study of a jet compressor based on a closed cycle in which the waste thermal energy available from an MPD system is transferred to a primary jet stream which compresses the MPD generator working medium; and (2) to design, fabricate and test a single stage jet compressor predicated on the results of the analysis and design study.

AD-610 176 Div. 7, 9
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
PERFORMANCE AND FLUID FLOW CHARACTERISTICS OF AN ELECTRO-FLUID DYNAMIC GENERATOR.
Master's thesis,
by Jay Roy Roland. Aug 64, 106p GA/ME/64-5
Unclassified report

Descriptors: (*Electric power production, Magnetohydrodynamics), (*Magnetohydrodynamics, Generators), (*Energy conversion, Magnetohydrodynamics), Fluid flow, Electric fields, Gas ionization, Fluid dynamic properties, Fluid mechanics, Charged particles, Boundary layer, Loading (Mechanics), Instrumentation, Pressure, Voltage, Performance (Engineering), Ions, Tests.

An investigation was conducted on performance and fluid flow characteristics of an EFD (electro-fluid dynamic) generator in order to experimentally determine the performance of an EFD generator using two different ground plate inserts under various conditions. The generator consisted of a closed loop pressurized system with an ejector powered seconary flow. An ion production system produced a locally intense electric field which partially ionized a high velocity neutral gas. The ions were carried through a conversion duct against a potential gradient, and were then collected and neutralized. Because the electric field from the collector opposed the motion of the ions, fluid dynamic energy was converted into electrical energy. In Phase I of this study, four configurations were tested under various conditions in order to determine the best geometric configuration, to check needle currents, and to measure performance. In Phase II a modified conversion duct was used to measure total pressure profiles and static pressure at four stations along the duct. Results showed that the normal ground plate insert gave better performance because of higher needle currents, and that the primary to secondary pressure ratio of three did not yield maximum needle current, as a pressure ratio of four gave a definite increase. (Author)

AD-610 178 Div. 7, 25, 30
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN EXPERIMENTAL STUDY OF A HOLLOW CATHODE FOR ARC DEVICES.
Master's thesis,
by Roland A. Stebbins. Aug 64, 126p GA/ME/64-7
Unclassified report

Descriptors: (*Cathodes, Electric arcs), Voltage, Electric currents, Heat transfer, Experimental data, Controlled atmospheres, Air, Anodes, Argon, Coils, Performance (Engineering), Vortex generators, Magnetic fields.

The voltages, currents, and heat loads to a coiled anode and multi-element hollow cathode were determined. The cathode consisted of a flat water-cooled base element and five hollow, water-cooled disks in a vertical column above it. The cathode elements were insulated, and shunt resistors were used to cause the cathode current to split into six paths. The anodes were water-cooled coils of 1/4-in. diameter copper tubing. A convergent-divergent shape was used with an air atmosphere, and a two row coil was used with argon. The coil current produced a magnetic field which increased anode life. The anode was mounted above the cathode, and the arc was not enclosed. When operated in air, the cathode sustained currents of 200-300 amperes before failure. Operation in argon was limited by constrictor failure to about 200 amperes. Cathode condition was very good after 40 test runs in argon at total currents ranging from 83 to 218 amperes. Calorimetrically measured heat loads decreased when the current split among the cathode elements and further decreased in an argon atmosphere. (Author)

AD-610 270 Div. 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE NEW NICKEL-ZINC STORAGE BATTERY,
by N. A. Zhulidov and F. I. Efremov. 5 Jan 65,
8p FTD-TT-64-605
TT 65 60976
Unclassified report

Novyi Nikel'-Tsinkovyi Akkumulyator, unedited rough draft trans. of Vestnik Elektropromyshlennosti (USSR) 1963, v. 34, no. 2, p. 74-75.

Descriptors: (*Storage batteries, Reviews), Zinc, Nickel, Alkaline cells, Construction, Performance (Engineering), USSR.

A review is given of the construction and operating characteristics of Soviet-built Ni-Zn batteries.

AD-610 274 Div. 7, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PROPERTIES OF FILM PICKUPS OF HALL EMF AND THEIR APPLICATION TO MEASURING MAGNETIC FLUXES,
by O. D. Elpat'evskaya. 17 Dec 64, 8p
FTD-TT-64-452
TT 65 60980
Unclassified report

Unedited rough draft trans. of mono. Elektroprivod i Avtomatizatsiya Promyshlennykh Ustanovok G.É.I., Moscow/Leningrad, 1960, p. 467-469.

Descriptors: (*Semiconducting films, Hall effect), (*Fluxmeters, Magnetic fields), Magnetic properties, Electric currents, Electric fields, Voltage, Mercury alloys, Selenium alloys, Tellurium alloys, Mica, Vapor plating, Vacuum apparatus, Harmonic analysis, USSR.

Work was carried on in the creation of a new type of pickups of emf on the Hall principle on the basis of thin polycrystallic layers of selenide and telluride of mercury. The properties of semiconductor substances in thin layers ordinary are distinguished very much from the properties of solid specimens. Particularly, the mobility of the carriers of the electric current in films as a rule is considerably lower than in single crystals and Hall's effect is insignificantly small. As a result of the experiments conducted, technology was created permitting the obtainment of thin layers of HgSe - HgTe with a high figure for the mobile carriers of electric current. The thin film were applied to insulating mica bases by the method of thermal vaporization in a vacuum.

AD-610 324 Div. 7
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
POTENTIAL LOGICAL INVERTER WITHOUT COMMUTATION ELEMENTS,
by L. A. Vereshchagin and N. M. Rudnyi.
8 Dec 64, 6p FTD-TT-64-642
TT 65 61040

Unclassified report

Unedited rough draft trans. of Avtomatika i Priborostroenie (USSR) 1964, v. 3, no. 1, p. 45-47.

Descriptors: (*Inverters, Electric bridges), (*Commutators, Inverters), Control systems, Circuits, Alternating current, Synchros, Electric motors, Electrical equipment, Wiring diagrams, USSR.

The described logical inverter does not contain any commutating elements. The inverter is made in accordance with a bridge circuit formed by equally active resistances. One diagonal of the bridge is connected with a power pack, and the other with the input of the device. The output signal is taken from one of the resistances. The inverter can operate on AC and pulsating current (after single or double semi periodic rectification). An example of employing the potential logical inverter for controlling AC electric motors (asynchronous or synchronous) is given.

AD-610 331 Div. 7, 26, 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CREATION AND ADOPTION OF SYSTEMS OF ELECTRICAL EQUIPMENT,
by N. A. Obolenskii. 9 Jan 65, 12p FTD-TT-64-827
TT 65 61032

Unclassified report

Unedited rough draft trans. of Elektrichestvo (USSR) 1964, no. 4, p. 1-4.

Descriptors: (*Electrical equipment, Industrial research), (*Industrial production, Electrical equipment), Electric power production, Economics, Industrial equipment, Electrical engineering, Electrical industry, USSR.

The role of the Russian electrotechnical industry in the solution of problems on how to create and adopt electrical equipment, intended for generation, distribution, transformation and utilization of electrical energy in all branches of national economy is discussed.

AD-610 339 Div. 7, 8, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TRANSFORMER OF CONTINUOUS VALUES (VOLTAGE, CURRENT, ILLUMINATION) INTO DISCRETE ONES,
by V. A. Gorokhov. 7 Jan 65, 4p FTD-TT-64 623
TT 65 61033

Unclassified report

Unedited rough draft trans. of Russian patent 160,038, appl. no. 698263/26, 21 Aug 61, 2p.

Descriptors: (*Transformers, Design), (*Pulse generators, Design), Semiconductor devices, Triodes, Voltage, Electric currents, Illumination, Patents, USSR.

Transformers of continuous values (voltage, current, illumination) into discrete values, built on a pulsed generator with a sensitive element connected into the initial circuit of same, are known. The proposed transformer differs from the known ones by the fact, that in the role of sensitive element in it is used a semiconductor triode, connected into the initial circuit of the generator with its collector-base transition. This assures a linear dependence of the frequency of the generated pulses upon the initial value.

AD-610 356 Div. 7, 12
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ELECTRIC POWER STATION IN THE COSMOS,
by Yurii Marinin. 7 Jan 65, 6p FTD-TT-64-633
TT 65 61029

Unclassified report

Unedited rough draft trans. from Sovetskaya Belorussiya (USSR) 1963, 9 Jul, p. 3.

Descriptors: (*Electric power production, Space flight), (*Solar cells, Space flight), (*Solar panels, Space flight), (*Space flight, Electric power production), USSR, Radioactive isotopes, Nuclear reactors, Radiological contamination, Moon, Power supplies.

An account is given of generation of electric power for travel by rockets, satellites, and space ships. The power is generated by solar means, radioactive isotopes, or nuclear reactors. Brief mention is made of the flight of 'Mariner II' toward Venus and of the use of radioisotopes for the American navigational satellites 'Transit IV A' and 'Transit IV B'. Radioactive contamination of the Moon or of any other planet on which landings might be made is also discussed.

8. Electronics and Electronic Equipment

AD-609 903 Div. 8, 6, 25
OTS Prices: HC $3.00/MF $0.75

Radiation Lab., Univ. of Michigan, Ann Arbor.
MODIFICATION TO THE SCATTERING BEHAVIOR OF A SPHERE BY REACTIVE LOADING.
Scientific rept. no. 2,
by V. V. Liepa and T. B. A. Senior. Oct 64, 80p
ORA-5548-2-T
Contract AF19 628 2374, Proj. 5635, Task 563502
AFCRL 64 915
Unclassified report

Descriptors: (*Spheres, Scattering), (*Microwaves, Scattering), (*Electromagnetic waves, Scattering), Microwave frequency, Superhigh frequency, Radar echo areas, Radar reflections, Antennas, Electric fields, Mathematical analysis, Metals, Graphics.

Electromagnetic scattering behavior by a metallic sphere loaded with a circumferential slot in the plane normal to the direction of incidence is investigated. The slot is assumed to be of small but non-zero width with electric field constant across it, and under this assumption the analysis of external field is exact. The field scattered in any direction is obtained by superposition of the field diffracted by an unloaded sphere and that radiated by an excited slot at the position of the load, with the radiation strength of the slot related to the loading characteristics in the combined problem. Thus, there are two parameters that determine the scattering behavior of this object: the loading admittance and the position of the slot. Numerical results are presented primarily for the case of back scattering and these are compared with experimental measurements made using a metallic sphere with an equatorial slot backed by a radial cavity of adjustable depth. (Author)

AD-609 918 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
COMPACT ANECHOIC CHAMBER FOR PRODUCTION TESTING VHF ANTENNAS.
Technical rept.,
by W. P. Czerwinski. Nov 64, 22p
Proj. 1CO 14501B31A, Task 1CO 14501B31A00
ECOM 2514
Unclassified report

Descriptors: (*Antennas, Very high frequency), (*Anechoic chambers, Test facilities), Radio-frequency, Absorption, Electrical impedance, Simulation.

The need for a production-line facility which permits making impedance measurements, matching network adjustments, and power handling tests of a VHF antenna without radiating a signal, led to the exploratory experimental investigation of a compact R-F anechoic chamber. Design criteria were evolved which resulted in a reasonably small chamber while simulating free-space environment for all kinds of tests except pattern measurements. (Author)

AD-609 919 Div. 8
OTS Prices: HC $3.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
ERROR PROBABILITIES FOR CERTAIN SPREAD CHANNELS.
Physical and mathematical sciences research papers,
by John N. Pierce. Dec 64, 66p
Proj. 5628
AFCRL 64 978; AFCRL PMSRP72
Unclassified report

Descriptors: (*Diversity reception, Optimization), (*Wave transmission, Optimization), (*Communication theory, Probability), Errors, Signal-to-noise ratio, Pulse modulation, Signals, Frequency shift keyers, Multipath transmission, Radio transmission, Communication systems, Numerical analysis, Integral transforms, Stochastic processes.

On an overspread channel, the total average energy in a received signal is divided among a large number of independently fading components, and the distribution of energy among these components can be only partially controlled by the signal design. It is shown, by numerical results for a specific class of modulating waveforms and scattering functions, that this unavoidable energy division can be almost as efficient as the controlled division of energy achieved by frequency diversity on an underspread channel. It is also shown that M-ary transmission alphabets are effective in combatting extremely severe channel overspreading. Asymptotic results, derived for long rectangular modulating pulses, permit determination of a lower bound on channel capacity that depends only on certain marginal properties of the scattering function. (Author)

AD-609 930 Div. 8, 12
OTS Prices: HC $3.00/MF $0.75

Hughes Aircraft Co., Culver City, Calif.
RADIATION PATTERNS OF ANTENNAS ON PLASMA ENCLOSED CYLINDERS.
Scientific rept. no. 7,
by H. H. Harris, A. T. Villeneuve, and L. A. Broca.
Oct 64, 55p P-64-110
Contract AF19 604 8386, Proj. 4600, Task 460001
AFCRL 64 993
Unclassified report

Descriptors: (*Antenna radiation patterns, Plasma sheath), (*Reentry vehicles, Antennas), Plasma medium, Cylindrical bodies, Electromagnetic waves, Hypersonic flight, Mathematical models, Programming (Computers), Mathematical analysis, Magnetic fields, Geometry, Communication systems.

The radiation patterns of an infinitesimal longitudinal magnetic line source on a plasma enclosed cylinder are presented. In the cases considered, the plasma is a homogeneous cylindrical layer which is not contiguous with the cylinder. Patterns are shown as a function of the colatitude angle for various values of the layer thickness and the constitutive parameters of the plasma. Transmission through lossy as well as lossless sheaths is considered. The discussion includes a summary of the mathematical problem, computational considerations, and leaky wave effects. (Author)

AD-609 932 Div. 8, 20
OTS Prices: HC $2.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
RADIATION EFFECTS ON FIELD-EFFECT TRANSISTORS, PART I.
Technical rept.,
by Edwin T. Hunter. Jun 64, 31p
Tasks 5900 21 830 23 00, 1P622001A056 01
ECOM 2462
Unclassified report

Descriptors: (*Transistors, Radiation damage), (*Radiation damage, Transistors), Transients, Electric currents, Voltage, Bremsstrahlung, Volume, Conductivity.

Several varieties of junction gate field-effect transistors were studied to determine transient drain currents upon exposure to single pulses of bremsstrahlung from the White Sands linear accelerator. Data obtained indicate that the transient currents are dependent on a) the junction volume and b) the transconductance. At low gate voltages, where the transconductance is close to its maximum value, the transient I sub D is small compared to the operating I sub D. However, at gate voltages near 'pinch-off', the transient I sub D is much larger than the operating I sub D and may present problems in switching applications. (Author)

AD-609 934 Div. 8, 25
OTS Prices: HC $4.00/MF $0.75

Microwave Device and Physical Electronics Lab., Univ. of Utah, Salt Lake City.
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LABORATORY CONSOLIDATED QUARTERLY REPORT FOR THE PERIOD JULY 1, 1964 TO SEPTEMBER 30, 1964.
Technical rept.
30 Sep 64, 115p MDL-Q-10
Contracts Nonr128805, AF04 693 439
Unclassified report

Contracts AF33 657 8677, DA36 039AMC02372E, Grant NSF GK29.

Descriptors: (*Electronics, Electromagnetic waves), (*Microwave frequency, Electronics), (*Light, Electronics), (*Plasma physics, Electronics), (*Electron beams, Microwave equipment), (*Quantum mechanics, Electronic equipment), Backward wave oscillators, Dielectrics, Circuits, Cyclotron waves, Waves guides, Lasers, Tunneling (Electronics), Masers, Plasma oscillations, Rocket motors, Exhaust gases, Superconductivity, Mathematical analysis, Semiconductor devices.

Contents: A 36-40 kMc multiple-ladder circuit backward-wave oscillator; Dielectric slow-wave circuits; Rotating beam devices; Cyclotron-wave device; Multiple-beam interactions; Magneto-electric beam compression; Transverse beam waves; A two-millimeter backward-wave oscillator; Irradiated laser materials; Tunneling studies; Millimeter wave masers; Gas laser studies; Waves in plasmas; Plasma generation and measurements; Plasma for a coupling medium; Rocket exhaust studies; Superconductivity.

AD-609 953 Div. 8, 20, 31
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Pleasanton, Calif.
RESEARCH AND DEVELOPMENT PROGRAM OF THERMIONIC CONVERSION OF HEAT TO ELECTRICITY.
Quarterly technical summary rept. no. 1, 1 Jul-30 Sep 64.
30 Oct 64, 11p GEST-2042
Contract NObs90417, Proj. SR007 12 01, Task 807
Unclassified report

Descriptors: (*Thermionic converters, Diodes), (*Reactor fuel elements, Thermionic converters), Design, Tungsten, Niobium, Aluminum compounds, Oxides, Tungsten alloys, Rhenium alloys, Thermal stresses, Manufacturing methods, Test methods.

This report describes the work accomplished toward the development of possible methods of connecting one thermionic diode to the next in a closely spaced series array such as that intended for use in a nuclear fuel element for Navy applications. The design of the first prototype thermionic series-connected assembly has been completed. A preliminary thermal and stress analysis has been performed. Fabrication techniques have been reviewed and the method of fabrication and assembly selected. Testing techniques for the series-connected assembly have been established.

AD-609 967 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Dumont (Allen B.) Labs. Div., Fairchild Camera and Instrument Corp., Clifton, N. J.
PROGRAM TO DEVELOP A 12 INCH DIAMETER FIBER OPTIC FACEPLATE CATHODE RAY TUBE.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64, by Madison Cawein. 20 Nov 64, 13p SI-5874, MO-10159
Contract NObsr91206, Proj. SF0070501, Task 6030
Unclassified report

Descriptors: (*Fiber optics, Cathode ray tubes), (*Cathode ray tubes, Manufacturing methods), Electron guns, Electron tube parts, Glass, Specifications, Design.

The purpose of this program is to develop, fabricate and supply two fiber optic faceplate cathode-ray tubes, having the electrical characteristics of the 12BCP19. These tubes will be suitable for testing in the AN/SYA-4(V) Console Data Input Display. The basic and component designs were completed and components were ordered. The electron gun design was evaluated for possible difficulties in manufacture and a method for pretesting the electron guns was developed.

AD-609 990 Div. 8, 5
OTS Prices: HC $2.00/MF $0.50

Naval Research Lab., Washington, D. C.
A TELETYPE COMMUNICATIONS AUTOMATIC SWITCHING SYSTEM.
Interim rept.,
by P. B. Palmer. 15 Oct 64, 46p
Tasks SS024 001 9081, SS024 001 9088
NRL MR1576
Unclassified report

Descriptors: (*Teletype systems, Switching circuits), (*Switching circuits, Teletype systems), Communication systems, Computer logic, Display systems, Control panels, Coding, Storage, Input-output devices, Electric switches, Electric relays, Automatic.

In order to speed up a torn-tape communication relay operation, a device was built which connects as many of the incoming messages as possible directly to the outgoing communication line, thus reducing the average time required for completion of a message transmission. The messages arriving when the outgoing line is busy are stored in a common bank of reperforators, to be read over the line later. The system is able to work with considerably fewer reperforators than message input lines because of the relatively low duty cycle on each input line of messages designated for retransmission. Operator time is saved because fewer tapes are produced, and these tapes do not require editing. Crossbar switches were used to achieve the capability of routing fifteen input lines to one communication line or one of six storage reperforators. At the present time, the device is operating with twelve of its input lines active, and it is rare that more than three of its reperforators are in use at one time. (Author)

AD-609 994 Div. 8
OTS Prices: HC $3.00/MF $0.75

Motorola, Inc., Phoenix, Ariz.
DETAILED STUDY OF DELETERIOUS EFFECTS ON SILICON TRANSISTORS.
Quarterly rept. no. 3, 29 Apr-28 Jul 64,
by Ki Dong Kang. Dec 64, 54p
Contract AF30 602 3244, Proj. 5519, Task 551906
RADC TDR64 436

Unclassified report

See also AD-609 065.

Descriptors: (*Transistors, Degradation), (*Silicon, Transistors), Gain, Stresses, Direct current, Surface properties, Thermal stresses, Reliability (Electronics), Aging (Materials), Encapsulation, Oxides, Coatings.

A complete summary on common emitter DC gain degradation phenomena on NPN transistors is given. The h sub Fe degradation, with respect to nonbias temperature stress, reverse bias plus temperature stress, operating life stress, encapsulating ambient, surface contamination, surface coating, etc., is discussed. Also models for h sub FE degradation are presented. In the second part the reasons why the surface sensitive parameters are not closely correlated are discussed. (Author)

AD-609 995 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Motorola, Inc., Phoenix, Ariz.
FAILURE MECHANISMS AT METAL-DIELECTRIC INTERFACES.
Quarterly technical documentary rept. no. 3,
6 Jun-5 Sep 64,
by David Peterson. Dec 64, 44p
Contract AF30 602 3266, Proj. 5519, Task 551906
RADC TDR64 459

Unclassified report

See also AD 609 066.

Descriptors: (*Capacitors, Films), (*Dielectric films, Capacitors), (*Metal films, Capacitors), (*Surface properties, Capacitors), Stresses, Failure (Mechanics), Electrodes, Aluminum, Gold, Capacitance, Reliability (Electronics), Tantalum capacitors, Tracer studies, Dielectrics, Glass, Diffusion, Ceramic capacitors, Tantalum, Tantalum compounds, Oxides, Silicon compounds.

Thin film capacitors have been used as a means of studying the changes induced at a metal dielectric interface by electrical and thermal stress. Long term stress testing indicates that a capacitor's stability may be grossly affected by surface contamination with water vapor prior to electroding. The nature of the electrode material also plays an important role in capacitor stability. The more active electroding metal, aluminum, produces capacitors considerably more stable than the capacitors using gold electrodes. It was found that the capacitance and dissipation factor of gold electroded capacitors exhibited greatest changes at lower frequencies. During stress test the capacitance and dissipation factor decreased during 1200 hours of accumulated test time, and then increased. DC measurements indicated that leakage through the dielectric film could not account for the changes observed. Thin film anodized Ta2O5 capacitors prepared for radioactive tracer studies have been placed on stress test. One group of units has now accumulated 12 weeks of stress time with a maximum increase of capacitance of 3.45 percent. A second group stressed at a higher level have shown capacitance changes of from +6.7 percent to -4.5 percent. (Author)

AD-610 008 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
THE LAW OF THE MIXER: THE MUTUAL INTERFERENCE CHART FOR PROBLEMS OF FREQUENCY ASSIGNMENTS AND ITS APPROXIMATION,
by Nello R. Castellini. Jul 63, 25p
Task 1G6 20501D449 01
USAEL TR2376

Unclassified report

Descriptors: (*Radiofrequency interference, Mixers (Electronic)), (*Mixers (Electronic), Radiofrequency interference), Electrical impedance, Circuits, Signal-to-noise ratio, Separation, Theory, Equations, Analytic geometry, Compatibility.

The mutual interference chart defined by the formula for the spurious frequencies resulting from the mixing process is interpreted in terms of analytic geometry. The spurious frequencies formula and the chart derived from it do not take complete account of the physics of the mixing process, that is, they do not take cognizance of the effect of the impedances of the circuit and nonlinearities of the mixer on the amplitude of the input waves. When this is done, the number of lines of the MIC is radically reduced. The procedure for constructing the reduced or practical chart on the basis of the derived relation, the analytic character of the general chart lines, the quality of service desired, and experimental data is briefly outlined. The reduced chart is far simpler than that predicted by conventional theory and becomes even simpler as the frequency increases. There is also an approximation to it consisting solely of a diagonal swath. Some shortcomings of available data and of the experimental approach are indicated, together with possible remedies suggested by the theory. (Author)

AD-610 009 Div. 8, 12, 25
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
ELECTRODYNAMICS IN A MAGNETO-IONIC ENVIRONMENT.
Interim rept.,
by William R. Faust. 12 Nov 64, 17p
Proj. SF019 02 02 7447
NRL 6163

Unclassified report

Descriptors: (*Plasma physics, Electromagnetic waves), (*Electromagnetic waves, Ionospheric propagation), (*Ionospheric propagation, Electromagnetic waves), (*Plasma sheath, Satellites (Artificial)), Theory, Magnetohydrodynamics, Ionosphere, Electromagnetism, Satellite antennas, Perturbation theory, Equations.

The equations of electromagnetic wave propagation in a magneto-ionic environment are first derived via the hydrodynamic equations of motion. This subject is presented in order to exhibit explicitly the approximations made in obtaining the equations of electrodynamics as applied to a plasma. An application of the above results are then made to derive a generalized equation of reciprocity for a plasma medium. Last a theoretical discussion of the plasma sheath surrounding a satellite shows that the satellite is charged to a potential of about 0.75 volt and that the sheath extends out about 2.5 cm. Such a sheath may affect the characteristics of an antenna. (Author)

AD-610 011 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.

OPTIMIZING FAST SOLID-STATE PHOTOCONDUCTIVE CELLS FOR PCM APPLICATIONS.
Technical rept.,
by Herbert L. Mette. Sep 64, 14p
Proj. 1P6 22001A056, Task 1P6 22001A056 03
ECOM 2497

Unclassified report

Descriptors: (*Photoelectric materials, Pulse modulation), (*Photoelectric cells (Semiconductor), Pulse modulation), (*Light pulses, Demodulation), Mathematical analysis, Signals, Solid state physics, Semiconductor devices, Light transmission.

This report discusses the characteristics of photoconductive devices in general terms relative to their basic semiconductor parameters, particularly for the detection of very short light signals. Included are two cases to be distinguished, i.e., where the pulse length is longer or where it is shorter than the carrier lifetime. In the first case, the rise time, decay time, and maximum signal sensitivity are almost completely determined by the lifetime alone, while in the second case the rise time and signal sensitivity are independent of the lifetime and only dependent on the length and integral over the intensity of the light pulse. Methods for optimizing cell parameters for both modes of operation are examined, and the use of photoconductive cells for the detection of pulse-code modulated signals is discussed. (Author)

AD-610 020 Div. 8
OTS Prices: HC $2.00/MF $0.50

National Co., Inc., Malden, Mass.
PRODUCTION ENGINEERING MEASURE FOR CESIUM BEAM TUBES.
Quarterly progress rept. no. 4, 23 Feb-23 May 64,
by James George. 23 May 64, 28p
Contract DA36 039AMC01457

Unclassified report

See also AD-607 967.

Descriptors: (*Cesium electron tubes, Manufacturing methods), Performance (Engineering), Design, Frequency, Stability, Reliability (Electronics), Quality control, Life expectancy, Test methods, Atomic clocks.

The program is defined and broken down into component tasks. The tasks performed during this reporting period involved a final evaluation of the performance characteristics of the second two (PEM-E3 and PEM-E4) of six engineering model cesium beam tubes. Performance data is presented on frequency accuracy and stability as evaluated in NC1601 Atomichrons. Reference standards used were an NC2001 Atomichron and a U. S. Signal Corps Tactical Rubidium Frequency Standard. Life testing of the PEM-E3 and PEM-E4 tubes is described and data is presented. Accelerated life testing of beam tubes has proved feasible. The improved design characteristics of the PEM-E5 and PEM-E6 tubes are described in detail. (Author)

AD-610 021 Div. 8, 6, 25, 30
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 4. RADAR.
Quarterly progress rept. for 1 Sep - 30 Nov 64.
15 Dec 64, 22p
Contract AF19 628 500
ESD TDR64 585

Unclassified report

See also AD-607 160.

Descriptors: (*Radar, Scientific research), Radar signals, Radar antennas, Radar equipment, Doppler radar, Monopulse radar, Phased arrays, Millimeter waves, Microwave equipment, Parametric amplifiers, Tunnel diodes, Waveguides, L band, S band, X band, Noise (Radar), Radiometers, Pulse compression, Broadband, Temperature control, Ranges (Distance), Multiple beam antennas.

Research activities in the field of radar are presented. Subject fields include: radar signal processing, transmitters, array radars, range measurements, and microwave components.

AD-610 022 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR COLUMBIUM CAPACITORS.
Quarterly rept. no. 5, 26 Jun-26 Sep 64.
26 Sep 64, 17p
Contract DA36 039AMC01468E

Unclassified report

Descriptors: (*Capacitors, Niobium), (*Manufacturing methods, Capacitors), Specifications, Failure (Mechanics), Capacitance, Voltage, Life expectancy, Performance (Engineering), Reliability (Electronics), Stability.

During this quarter, construction of the four ratings required for the preproduction run was completed, and they are currently undergoing Group I life testing. Difficulties were encountered in meeting the electrical specifications, but life testing will continue, subject to government approval, in order to increase the knowledge of columbium materials in capacitor applications. The results of the study to determine the effects of voltage and capacitance derating indicated that such derating could reduce failure rates substantially, but it also disclosed several apparent deficiencies in the use of columbium as a capacitor material. (Author)

AD-610 024 Div. 8, 2
OTS Prices: HC $1.00/MF $0.50

Innsbruck Univ. (Austria).
PROPAGATION OF VLF WAVES. VLF MEASUREMENTS IN THE MINE OF BLEIBERG.
Scientific rept. no. 11,
by O. Grobner and Wolfram Bitterlich. 15 Oct 64, 8p
Contract AF61 052 490
AFCRL 64 1013

Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Rock (Geology), Wave transmission), Mining engineering, Minerals, Ores (Metal sources), Very low frequency, Measuring devices (Electrical and electronic), Radio-frequency power. Zinc compounds, Lead compounds, Sulfides.

Measurements of VLF propagation in rock showing considerable mineralization (ZnS, PbS) are described. The measurements show that inhomogeneities can be proved with satisfactory accuracy only by choosing the frequency and distance of measurement adequately. Besides these measurements conducted by means of a VLF transmitter set up in the mine, the reception of VLF transmitters (GBR) over large distances was measured and the results are discussed. (Author)

AD-610 025 Div. 8, 30, 32
OTS Prices: HC $3.00/MF $0.75

System Development Corp., Santa Monica, Calif.
INFORMATION DISPLAYS AND INFORMATION PROCESSING TASKS.
Professional paper,
by Harriet W. Foster. 30 Sep 64, 79p SP-1811
Unclassified report

Descriptors: (*Communication systems, Display systems), (*Display systems, Communication systems), (*Communication theory, Reviews), Vision, Visual perception, Computer storage devices, Coding, Redundant components, Information retrieval.

This paper is an attempt to summarize some of the findings concerning visual display variables as they relate to different kinds of information processing tasks. Not all of the relevant literature is covered. The original purpose was to search the literature for data relating display variables particularly to 'problem-solving' tasks. It appears, however, that most of the available data have been collected using less complex tasks. There may actually be an advantage to this fact, in that as the task becomes more and more complex one may have less and less confidence in generalizing from the findings with any one task to another. This paper attempts to do two things: to identify certain task functions which may either be tasks in themselves or components of more complex problem-solving tasks, and to summarize some of the findings relating display variables and tasks. The paper is divided into four sections which discuss the situation represented in the display, the coding and display of information, information processing tasks, and characteristics of the individual processor.

AD-610 033 Div. 8, 6, 25
OTS Prices: HC $3.00/MF $0.75

Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
LF, VLF, ELF PROPAGATION STUDIES. AUDIO AND SUB-AUDIO FREQUENCY EM WAVES PROPAGATED FROM SPHERICAL PLASMA SOURCES EXCITED BY ACOUSTIC PERTURBATIONS.
Annual rept. for 3 Aug 63-3 Aug 64,
by J. Ralph Johler. Nov 64, 55p NBS-8433
Contract AF30 602 2488, Proj. 5582, Task 558203
RADC TDR64 425
Unclassified report

Descriptors: (*Plasma oscillations, Wave transmission), (*Electromagnetic waves, Propagation), Sound, Excitation, Antenna Radiation patterns, Thermodynamics, Extremely low frequency, Very low frequency.

An oscillating ionized plasma of finite size can be shown theoretically to be a new type of transmitter of EM-waves. Acoustic waves traveling through the plasma are postulated as a source of excitation of the EM-waves propagated from the plasma. The antenna pattern of the spherical plasma source of EM-waves energized by such acoustic waves can be quantitatively described. (Author)

AD-610 037 Div. 8
OTS Prices: HC $4.00/MF $1.00

Technical Research Group, East Boston, Mass.
DESIGN OF METAL SPACE FRAME RADOMES.
Final rept.,
by Alan F. Kay and Donald Paterson. Nov 64, 133p
Contract AF39 602 2937, Proj. 5579, Task 557901
RADC TDR64 334
Unclassified report

Descriptors: (*Radomes, Design), Metals, Antenna lobes, Dielectric properties, Dielectric films, Honeycomb cores, Electromagnetic properties, Wave transmission, Structures, Mathematical analysis, Loading (Mechanics), Performance (Engineering).

Design graphs, formulas and procedures for the design and evaluation of the electrical performance of metal space frame radomes is presented covering specifically transmission loss, boresight error, and side-lobe variation. The relative merits of metal and dielectric elements is analyzed. The study consists of developing a straight forward simple procedure for the optimum sizing of solid beam elements for large space frame radomes. Equations were derived expressing the relationship between the element dimensions necessary to satisfy a prescribed electrical transmission loss and the structural integrity of the space frame. These equations, considered as design constraints, were utilized in the selection of the element size which satisfied a defined optimum criterion. Two optimization criteria were adopted: first, the minimization of the transmission loss subject to a constraint of structural integrity and, second, the reduction of the total structural weight of the elements which simultaneously satisfy the transmission loss and structural constraint. A sample design computation was conducted as an example of the procedure. The second optimization criterion was applied to a 150 foot diameter radome which was required to sustain 150 mph winds. A procedure for implementing the first optimization criterion employing the method of Lagrangian multipliers was presented resulting in four equations to be solved simultaneously. (Author)

AD-610 057 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Electronic Defense Labs., Mountain View, Calif.
LIGHT MODULATION DETECTOR.
Interim engineering rept. no. 3, 15 Oct 64-15 Jan 65,
by Russell Targ, W. D. Bush, and G. A. Massey.
16 Jan 65, 27p EDL-M811
Contract AF33 615 1938
Unclassified report

See also AD-604 022.

Descriptors: (*Lasers, Oscillators), (*Demodulators, Light), (*Light, Demodulators), Modulation, Microwave frequency, Frequency stabilizers, Frequency modulation, Tuning devices, Signal-to-noise ratio, Gases, Mixers (Electronic), Interferometers, Signals, Optical equipment.

This third interim engineering report describes work performed by Sylvania Electronic Systems - West in the third quarter of an experimental and theoretical program to determine the feasibility of an automatic-frequency-controlled (AFC) optical heterodyne receiver for the detection and demodulation of microwave-modulated light. The work of this quarter was divided into two main activities. The first was directed toward the demonstration of the 'supermode' laser. Originated and first successfully employed in this laboratory, this is a technique for producing essentially single-frequency light using an output beam from a multimode laser, without suffering the loss of power inherent to conventional approaches which involve the suppression of modes. The second phase of the work in this quarter was concerned with the assembly and test of the AFC system used with the laser local oscillator to track the variations in frequency between the laser local oscillator and an independent laser transmitter sending microwave information. The AFC system has been assembled and tested with two lasers. Results show that all components of the system operate in accordance with the design, and frequency lock was achieved using the automatic acquisition circuits, without any necessity for manually tuning the lasers. (Author)

AD-610 066 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
MULTIMEGAWATT BROADBAND MICROWAVE TUBES.
Quarterly status rept. no. 11, 1 May-31 Jul 64,
by Marvin Chodorow. Dec 64, 35p ML-1224
Contract AF30 602 2575, Proj. 5573, Task 557303
RADC TDR64 465

Unclassified report

See also: AD-607 450.

Descriptors: (*Microwave equipment, Traveling-wave tubes), (*Traveling-wave tubes, Microwave frequency), Circuits, Broadband, Klystrons, Electron beams, Space charges, Oscillation, Stability, Waveguides, Acoustics, Acoustic equipment, Transducers, Microwaves, Plasma medium, Test equipment (Electronics).

The centipede circuit was adapted for use on the electron stick in such a manner that the amplitude and phase of the growing wave along the beam-circuit interaction length could be measured. The results of this study will be of utmost value in optimizing the many parameters affecting the beam-circuit interaction. Current results of theory and experiment are presented. Tests on the electron stick for the suppression of parasitic oscillations were conducted: By covering the entire stick with a thin sheet of directionally resistive mylar, oscillations were removed, up to 30 kV. Two other sources of instability were found and removed: feedback oscillations and monotron oscillations. Work on calibration of external load and saturated-beam measurements is described. Studies on space-charge waves in an accelerated parallel-flow electron beam in a constant magnetic field were continued. The major emphasis this period was on the analysis of the second-order differential system; a discussion of the solutions for certain conditions is presented. Preliminary work on beam-plasma studies is described. The properties of microwave acoustic wave transducers were investigated in order to improve their conversion efficiency and bandwidth.

AD-610 074 Div. 8
OTS Prices: HC $4.00/MF $1.00

Sperry Gyroscope Co., Great Neck, N. Y. Radiation Div.
TRANSIENT BEHAVIOR OF LARGE ARRAYS.
Interim rept. for 1 Mar-30 Jun 64,
by G. F. Ross, J. Hanley, L. Susman, and A. S. Ferello. Dec 64, 145p EB-5287-0500-1
Contract AF30 602 3348, Proj. 4506, Task 450604
RADC TDR64 348

Unclassified report

Descriptors: (*Antenna feeds, Microwave networks), (*Microwave networks, Transients), Microwave equipment, Radar signals, Phase shifters, Ultrahigh frequency, L band, Power dividers, Electronic switches, Mixers (Electronic), Oscilloscopes, Coupling circuits, Pulse generators, Coaxial cables, Propagation, Linear systems, Partial differential equations, Graphics.

Results are reported of the first phase of a theoretical and experimental investigation into the transient response of microwave components used in feed networks of large antenna array systems. The concepts commonly used in linear lumped network theory are applied to the transient behavior of distributed networks. In particular, it was found that for TEM mode components a network characterization in the complex z-plane enables closed form solutions to be obtained from which the frequency response and transient behavior can be found. Flow graph techniques are applied to the analysis of TEM mode components, such as couplers, ring hybrids, power dividers, phase shifters, etc., and theoretical results for the impulse, step, and modulated step responses as well as the amplitude spectrums and phase functions are presented. Experimental results of tests on UHF and L-band components which verify the theoretical results are presented. The results were obtained by using newly developed techniques for generating pulses of approximately 0.2 nanosecond in duration and high-frequency sampling oscilloscope displays. (Author)

AD-610 149 Div. 8, 15, 30
OTS Prices: HC $2.00/MF $0.50

Coordinated Science Lab., Univ. of Illinois, Urbana.
GENERATION OF DIRECTED TREES, 2-TREES AND PATHS WITHOUT DUPLICATION,
by Archie Joseph Paul, Jr. Jan 65, 49p CSL-R-241
Contract DA28 043AMC00073E

Unclassified report

Descriptors: (*Topology, Networks), (*Networks, Topology), Switching circuits, Electrical networks, Digital computers, Circuits, Communication systems, Set theory, Graphics.

The increasing number of applications of graph theory to the solution of problems in many fields make it desirable to have available complete knowledge of the properties of these graphs. Since many problems in electrical networks, switching circuits, and communication nets can be formulated in terms of directed graphs, it is appropriate to study their properties. In this paper, procedures are developed for generating the directed trees, 2-trees and paths of a directed graph. Unlike other methods for generating these subgraphs, the procedures developed here avoid generating duplicate elements thus they eliminate the necessity of repeated search to select a complete set of elements. Proofs are given to verify that all elements of the set of directed trees, 2-trees or paths are generated and that no duplicate elements occur. Examples are given to illustrate the procedures in detail. The procedures are amenable to digital computer application. (Author)

AD-610 165 Div. 8
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Owensboro, Ky.
C-BAND TRIODE-CAVITY OSCILLATORS, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 64,
by J. D. Marshall. 30 Nov 64, 22p
Contract DA36 039AMC01474E

Unclassified report

See also AD-607 655.

Descriptors: (*Microwave oscillators, Triodes), (*Triodes, Microwave oscillators), C band, Manufacturing methods, Performance (Engineering), Test methods, Radiofrequency power, Frequency shift.

Assembly and testing of the pilot production phase has been demonstrated as exceeding the program requirements. Testing procedures which permitted greater efficiency have been described. (Author)

AD-610 190 Div. 8, 20
OTS Prices: HC $4.00/MF $1.00

Microwave Lab., Stanford Univ., Calif.

A LINEAR ELECTRON ACCELERATOR FOR SUBMILLIMETER WAVE GENERATION.
Technical rept.,
by R. H. Miller. Oct 64, 130p ML-1244
Contract Nonr22548, Proj. NR373 361

Unclassified report

Partly supported by the U. S. Army Signal Corps and the U. S. Air Force.

Descriptors: (*Millimeter waves, Linear accelerators), (*Linear accelerators, Millimeter waves), Microwave equipment, X band, Electrical properties, Magnetic fields, Waveguides, Radiofrequency generators, Electron guns, Klystrons, Phase (Electronics), Electric fields, Modulation, Particle accelerator components.

The use of a relativistic beam of electrons for the generation of submillimeter waves in large interaction structures was investigated as a possible alternative to the scaling of conventional microwave generators to the extremely small dimensions required. The design of an X-band linear accelerator for production of a beam having high harmonic current content is discussed, and various methods of achieving good bunching are considered. A small angle theory of bunching in a distributed buncher is developed and used as a guide in the design of the buncher section of the accelerator. A new microwave measurement technique for measuring field strength and phase in nonresonant structures was used to determine the electrical properties of the buncher. The effect of auxiliary equipment on the operation of the distributed buncher and accelerator is evaluated. Experimental results from the use of the accelerator with a magnetic undulator are presented. Radiation is detected in the range from the sixth harmonic to the eightieth harmonic (wavelength equals 0.4 millimeter) of the accelerator frequency. Peak powers generated are of the order of 150 mw at 5 mm, 40 mw at 1 mm, and 1/4 mw at 0.4 mm. The dependence of the radiation on magnetic field strength, magnet spacing, interaction length and waveguide size is in excellent agreement with theory. (Author)

AD-610 191 Div. 8, 25, 26
OTS Prices: HC $4.00/MF $0.75

RCA Defense Electronic Products, Camden, N. J.
PRODUCTION ENGINEERING MEASURE. MICRO-ELEMENT CRYSTALS.
Formal engineering rept.
Nov 64, 110p
Contract DA36 039SC75968, Task 33

Unclassified report

Rept. on Micromodule Program Extension II.

Descriptors: (*Crystals, Semiconductor devices), (*Subminiature electronic equipment, Manufacturing methods), (*Miniature electronic equipment, Packaging), Production, Radio communication systems, Microminiaturization (Electronics), Very high frequency, High frequency, Reliability (Electronics), Environmental tests, Life expectancy, Quartz, Crystal holders, Encapsulation, Hermetic seals, Modules (Electronic), Performance (Engineering).

The research consisted of an analysis phase and a process implementation phase. The analysis phase, which entailed designing crystal microelements adaptable to production of 1760 units per month, was conducted by three participating vendors: Midland Manufacturing Company, Bulova Electronics Division and McCoy Electronics Company. The three vendors produced hermetic sealed packages of these reduced crystal sizes which were an order of magnitude smaller than the state-of-the-art in the industry. Small quantities of these devices were produced and tested. The results demonstrated improvements over the units made available under the Initial Program. These improvements included: lower package cost, improved crystal mounting procedures, and package sealing techniques. The Midland design was selected for the process implementation phase because this design demonstrated the smallest physical size, lowest estimated production costs and circumvented special module processing previously associated with modules containing crystals.

AD-610 195 Div. 8, 25
OTS Prices: HC $1.00/MF $0.50

hp associates, Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 9, 1 Jul-31 Oct 64,
by Richard W. Soshea. 15 Nov 64, 21p
Contract AF19 628 1637, Proj. 4608, Task 460804
AFCRL 64 953

Unclassified report

Descriptors: (*Thermionic emission, Attenuation), (*Platinum, Absorption), Electrons, Silicon, Rhodium, Photoelectric effect, Resistance (Electrical), Optical properties, Electrical properties, Photons, Diodes (Semiconductor), Vapor plating, Triodes, Degradation, Temperature, Metal films.

The attenuation length of hot electrons in platinum was studied by the photoelectric method using Pt-Si Schottky barriers. The hot electron attenuation length in these films is equal to or less than 120A. The resistivity of these Pt films is in the range of 20 to 30 microhm-cm, indicating that the films may contain a sufficient density of structural defects to influence the hot electron attenuation length. Rhodium-silicon Schottky barriers were made which exhibit a barrier height of 0.78 volts. The barriers show no degradation during vacuum heating at temperatures as high as 600C. (Author)

AD-610 221 Div. 8
OTS Prices: HC $3.00/MF $0.75

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
THE MEASUREMENT OF PHASE AND AMPLITUDE RADIO WAVE INTERACTION AT UNIVERSITY PARK, PENNSYLVANIA, FOR JULY-AUGUST-SEPTEMBER, 1964.
Scientific rept.,
by A. J. Ferraro and H. S. Lee. 20 Jan 65, 68p
IRL-232
Contract AF19 628 4014; Grant NSF GP846,
Proj. 8605, Task 860502
AFCRL 64 992

Unclassified report

Descriptors: (*Luxemberg effect, Atmospheric sounding), (*Ionosphere, Luxemberg effect), (*Radio waves, Ionospheric propagation), Atmosphere, Electromagnetic waves, Radio transmission, Phase measurement, Amplitude modulation, Electron density, Atmospherics, Test facilities, Pennsylvania.

The measurement of phase and amplitude radio wave interaction, to be carried out during the IQSY, comprises the contents of this report. The interaction parameters, T sub A and T sub phi are given as a function of height for the dates and times indicated. These will be utilized to determine N, upsilon, T sub e and G as functions of height and time for D and lower E-region during the IQSY; and will be reported in following reports. The measurement of phase and amplitude radio wave interaction described in this report was made under the IQSY program supported mainly by the National Science Foundation, Grant GP-846.

It should also be acknowledged that a portion of the experimental facilities was provided by the Air Force Cambridge Research Laboratories, Office of Aerospace Research, United States Air Force, Bedford, Massachusetts under Contract AF19(628)-4014. (Author)

AD-610 259 Div. 8
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MONOPULSE FAR-FIELD PATTERNS,
Group rept.,
by Sheldon S. Sandler. 23 Jul 59, 21p LL-GR-315-1
Contract AF19 604 5200

Unclassified report

Descriptors: (*Antenna radiation patterns, Radar antennas), (*Monopulse radar, Horn antennas), Antennas, Tracking, Waveguides, Parabolic antennas, Antenna feeds, Gain, Model tests, Mathematical analysis.

AD-610 273 Div. 8, 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INFORMATION AND VISION, BY V. D. GLEZER AND I. I. TSUKKERMAN: BOOK REVIEW,
by N. D. Nyuberg. 5 Dec 64, 9p FTD-TT-64-401
TT 65 60979

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Vestnik, 1962, v. 32, no. 7, p. 123-125.

Descriptors: (*Communication theory, Vision), (*Vision, Communication theory), USSR, Retina, Coding, Statistical processes, Statistical analysis, Cybernetics, Perception, Television display systems, Images, Visual perception.

The book discusses problems of vision, particularly from the standpoint of information theory. Chapter 1 contains considerable experimental data on the receptive fields of the retina. Chapter 2 contains elementary information on information theory. Chapter 3, mainly on television images, shows the advantages of statistical coding and proposes a connection between the phenomena of physical optics and the principles of statistical coding. Chapter 4 concerns information theory, specifically the transmission of communications along a channel with noise, an attempt being made to prove that the visual system satisfies the properties of the ideal system of Shannon.

AD-610 302 Div. 8
OTS Prices: HC $2.00/MF $0.50

National Co., Inc., Malden, Mass.
PRODUCTION ENGINEERING MEASURE FOR CESIUM BEAM TUBES.
Quarterly progress rept. no. 5, 23 May-23 Aug 64,
by James George. 23 Aug 64, 36p
Contract DA36 039AMC01457

Unclassified report

See also AD-607 967.

Descriptors: (*Electron beams, Cesium electron tubes), (*Cesium electron tubes, Manufacturing methods), Performance (Engineering), Design, Failure (Mechanics), Electron tube heaters, Niobium, Gases, Absorption, Antimony, Life expectancy, Tests, Waveguides, Molybdenum, Mass spectroscopy, Spectrum analyzers.

The program is one of Production Engineering Measures for a general purpose cesium beam tube. This program is defined and divided into component tasks, and the tasks performed during the reporting period are described. The retrofitted PEM-E3 cesium beam tube was processed, aligned, bench tested, and placed on life test. Lift test of the PEM-E4 tube was terminated. Design of the PEM-E5 and PEM-E6 tubes was nearing completion at the end of the reporting period. The improved design characteristics of the PEM-E5 and PEM-E6 tubes are described. Final PEM-E3 performance characteristics and preliminary PEM-E5 performance characteristics are presented and discussed. (Author)

AD-610 305 Div. 8, 30
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
DESIGN AND CONSTRUCTION OF A BEAM ANALYZER,
Technical rept.,
by Charles DeSantis and Arthur Gottfried. Nov 64,
18p ECOM-2533
Proj. 1P6 22001A055, Task 1P6 22001A055 04

Unclassified report

Descriptors: (*Electron beams, Test equipment (Electronics)), (*Test equipment (Electronics), Electron beams), Focusing, Electron guns, Microwave equipment, Klystrons, Vacuum seals, Vacuum pumps, Scanning, Design.

This report describes the design, construction and use of a beam analyzer employed during an internal program to develop an electrostatically-focused, supported-drift-tube klystron. The major design features and construction details of the analyzer are discussed, together with the problems encountered in obtaining a sufficient vacuum for operation. Experimental results on an electrostatically-focused electron gun, of the type employed in the proposed klystron design, are discussed. Possible causes of poor beam transmission are considered. A brief evaluation is made of the operation and future use of the analyzer. (Author)

AD-610 306 Div. 8, 5
OTS Prices: HC $3.00/MF $0.75

Electrical Engineering Research Lab., Cornell Univ., Ithaca, N. Y.
DESIGN AND CONSTRUCTION OF A BAND-PASSED MATCHED FILTER,
Technical rept. no. 84,
by S. Rashba. Dec 64, 60p EERL-31
Contract DA36 039AMC00034E

Unclassified report

Descriptors: (*Matched filters, Pulse communication systems), (*Pulse communication systems, Matched filters), Band-pass filters, Pulse generators, Electromagnetic pulses, Microwave networks, Delay lines, Circuits, Gain, Inverters, Very high frequency, Bandwidth, Coding, Signal-to-noise ratio, Signals.

A band-passed matched filter and coded-pulse generator was designed and constructed using the five-digit Barker code. This band-passed matched filter has the desirable feature that it does not employ modulation or demodulation equipment, the modulation being inherent in the system. The basic construction uses the link structure, with the modification of separable links which permit easy alignment and the changing or enlarging of the code as desired. The need for negative digits in the Barker code is filled by the design and construction of special passive, 'inverter' networks that simply invert the signals appearing at the

input. The necessary delay is introduced by placing equal lengths of delay cable, rather than delay networks, between all grid networks. The performance of networks with from one to six links and of the inverter network are shown. Finally, the operation of the band-passed matched filter is given by the impulse responses of the coded-pulse generator and the matched receiver, and by the over-all system response. The measured ratio of central peak to side lobes was 3.6:1, which is close to 70 percent of the theoretically predicted value.

AD-610 319 Div. 8
OTS Prices: HC $2.00/MF $0.50

Electrical Engineering Research Lab., Cornell Univ., Ithaca, N. Y.
DESIGN OF DIVIDED-BAND AMPLIFIERS.
Technical rept. no. 83,
by K. R. Klechner. Dec 64, 37p EERL-29
Contract DA36 039AMC0004E Unclassified report

Descriptors: (*Band-pass amplifiers, Ultrahigh frequency), Band-pass filters, Bandwidth, Multiplex, Phase shift, Triodes, Circuits, Capacitance, Gain.

The engineering design of UHF multichannel or divided-band amplifiers is discussed. The problems of tube selection and filter design in meeting specified gain and bandwidth requirements are discussed in detail. Several representative types of high-transconductance triodes are considered, as are the circuit restrictions that such tubes impose. Fourth-order Butterworth filters are shown to be entirely adequate to perform band-splitting and recombination, and explicit design formulae are presented for all filter-circuit elements. Performance limitations imposed by currently available tube types are illustrated, and it is shown that the development of tubes with lower output capacitances (even at the expense of larger input capacitances) would permit more efficient amplifier performance. (Author)

AD-610 352 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON DESIGN POSSIBILITIES FOR CREATING THE RIGID ANTENNA FOR A PARABOLIC REFLECTOR OF GREAT DIMENSIONS,
by P. D. Kalachev. 29 Dec 64, 16p FTD-TT-64-597
TT 65 61025 Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Mashinostroenie (USSR) 1963, no. 12, p. 49-58.

Descriptors: (*Parabolic antennas, Design), Reflectors, Deformation, Elasticity, Wind, Angle of attack, Temperature, Rotation, Loading (Mechanics), Radio astronomy, Space communication systems, USSR.

An attempt was made to create a parabolico reflector which has little deformation under the action of loads from its own weight through a rational choice of design scheme in its framework and suspension on the supporting rotary device.

AD-610 353 Div. 8
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DISTRIBUTION OF OVERSHOOT LENGTH FOR THE ENVELOPE OF THE SUM OF A SINUSOIDAL SIGNAL WITH NORMAL NOISE ABOVE THE THRESHOLD LEVEL,
by B. R. Levin and Ya. A. Fomin. 22 Dec 64, 9p
FTD-TT-64-1051
TT 65 61026 Unclassified report

Unedited rough draft trans. of Radiotekhnika (USSR) 1964, v. 19, no. 1, p. 13-17.

Descriptors: (*Signal-to-noise ratio, Determination), Numerical analysis, Probability, Functions, Distribution, Integrals, Stochastic processes, Electromagnetic waves, Propagation, Statistical functions, USSR.

An approximation is made of the function of distribution of overshoot length of the envelope of the sum of a sinusoidal signal and normal stationary noise above the threshold level. Comparison is made of calculated curves and experimental data.

AD-610 355 Div. 8, 5
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
USE OF RECYCLING DEVICES FOR FREQUENCY-MODULATION-PULSE COMPRESSION,
by V. V. Lebedev. 14 Dec 64, 13p FTD-TT-64-524
TT 65 61028 Unclassified report

Unedited rough draft trans. of Radiotekhnika (USSR) 1963, v. 18, no. 11, p. 62-70.

Descriptors: (*Pulse compression, Radiofrequency pulses), (*Radiofrequency pulses, Frequency modulation), (*Radiofrequency filters, Noise (Radio)), Signal-to-noise ratio, Pulse modulation, Electromagnetic pulses, Filters (Electromagnetic wave), Mathematical analysis, Feedback, Mixers (Electronic), Series, Demodulation, Optimization, Radar pulses, Noise (Radar), USSR.

The possibility is examined of using recycling devices for optimum separation in the noises of the frequency-modulation pulse. Comparison is made with the usual filters on the lines of detention with dispersion. (Author)

AD-610 363 Div. 8, 5
OTS Prices: HC $3.00/MF $0.75

Army Radio Propagation Agency, Fort Monmouth, N. J.
TABULATED CHANNEL SEPARATION CRITERIA FOR COLLOCATED RADIO RELAY SETS AN/TRC-24.
Oct 64, 93p Unclassified report

Descriptors: (*Radio relay systems, Channel selectors), (*Channel selectors, Radio relay systems), (*Radio transmission, Optimization), Antennas, Separation, Radio reception, Radio communication systems, Radiofrequency interference, Tables.

This brochure summarizes accepted criteria for antenna spacing, and for channel separation between collocated Radio Sets AN/TRC-24. It presents this data in formats which will aid the user in selecting and assigning channels which provide the least mutual interference. The information will also acquaint users of the AN/TRC-24 with the capabilities of this set for interoperation of its J Band with the High Band of Radio Set AN/GRC-50. The required information is

provided in the form of tables listing certain channels which should not be used by Radio Sets AN/TRC-24 when a collocated AN/TRC-24 is receiving on particular channels. The brochure does not provide lists of every channel potentially capable of causing interference nor does every channel listed necessarily cause interference. Estimates are included concerning the effects of operation in one band on reception in adjacent bands.

AD-610 366 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Hughes Aircraft Co., Newport Beach, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 3, 15 Apr-15 Jun 63, by H. G. Dill. 15 Jun 63, 47p
Contract AF33 657 9771
See also AD-403 654. Unclassified report

Descriptors: (*Semiconducting films, Preparation), (*Integrated circuits, Transistors), (*Transistors, Semiconducting films), Cadmium compounds, Sulfides, Etched crystals, Vapor plating, Evaporators, Pentodes, Circuits, Electrical properties, Transistor amplifiers, Broadband, Bandpass amplifiers, Oscillators.

The first part of the report discusses some problems of thin film transistor (TFT) fabrication for the purpose of improving the TFT and to get new information for improving the design of fully integrated thin film circuitry. The second and main part of the report discusses the properties of TFT in comparison with vacuum pentodes and defines some requirements of thin film circuitry. The survey leads to a promising linear amplifier combination of high dc and ac stability. A design of a wide band amplifier circuit based on that principle and some measurement results are given.

9. Fluid Mechanics

AD-609 906 Div. 9, 30, 31
OTS Prices: HC $2.00/MF $0.50

Hydronautics, Inc., Laurel, Md.
MATHEMATICAL GENERATION OF A REALISTIC SEA,
by C. F. Chen, J. Auslaender, and R. Leopold.
Oct 63, 30p Hydro-TR-001-13
Contract NObs78396

Unclassified report

Descriptors: (*Mathematical models, Hydrodynamics), (*Hydrodynamics, Mathematical models), (*Ocean waves, Mathematical prediction), Oceans, Seas, Surface area properties, Hydrofoils, Fluid dynamic properties, Statistical analysis, Digital computers, Marine engineering.

Expressions are derived from which the instantaneous values of the surface elevation and orbital (particle) velocity encountered by a hydrofoil craft or other object traversing a realistic sea can be calculated as a function of time. These expressions, which are given in terms of an arbitrary energy spectrum were programmed for calculation on an electronic digital computer (using the Neumann Spectrum) for purposes of checking the reliability of the derived expressions and the computation scheme. The values of various significant parameters, such as the mean and 1/nth highest maxima of the surface elevation are found to be in good agreement with predicted (from statistical theory) and measured values. The concept of the relative broadness of various spectra is also discussed and incorporated into the checking scheme. (Author)

AD-609 955 Div. 9, 32
OTS Prices: HC $2.00/MF $0.50

Technical Research Group, Melville, N. Y.
SOME TOPICS IN THE THEORY OF COUPLED SHIP MOTIONS.
Final rept.,
by J. Lurye and J. Kotik. Oct 64, 32p TRG-015-FR
Contract Nonr451300, Proj. NR062 344

Unclassified report

Descriptors: (*Ships, Motion), (*Hydrodynamics, Ships), Theory, Fluid mechanics, Potential theory, Harmonic analysis, Moments, Damping, Pressure, Boundary value problems, Integral transforms, Numerical analysis.

In this report several different results in the theory of ship motions are presented. Some of the results express certain physical quantities in terms of other such quantities, while the remaining results are in the direction of computing physical quantities by solving boundary value problems. The following results are of the first type: (1) Kramers-Kronig relations with forward speed and cross-coupling; and (2) Impulse response in terms of force coefficient for simple harmonic motion. As work of the second type the authors present a numerical approach which seeks simplicity by avoiding integrations over curved surfaces and approximations to or representations of curved surfaces.

AD-609 957 Div. 9, 2
OTS Prices: HC $6.00/MF $1.50

National Engineering Science Co., Pasadena, Calif.
GRAVITY WAVES ON BOTTOM SLOPES AND WAVE RUNUP.
Final rept.,
by B. Le Mehaute. 26 Jun 64, 227p SN-165
Contract DA49 146XZ272
DASA 1543

Unclassified report

Descriptors: (*Gravity, Ocean waves) (*Ocean waves, Gravity), (*Hydrodynamics, Ocean waves), Water waves, Propagation, Ocean bottom topography, Underwater explosions, Earthquakes, Marine geophysics, Mathematical analysis, Programming (Computers), Oceanology.

A set of theories, computing methods and results for the propagation of explosion generated waves on a slope and wave runup are presented. Periodic gravity waves on a gentle slope are calculated, using a third order of approximation by assuming the conservation of energy flux. An adaption of a linear theory based on conformal mapping for studying the wave reflection due to the continental slope is presented. A critical analysis of numerical methods for studying gravity waves on a gentle slope is carried out. A computer program for studying spilling breakers and fully developed bores on a beach by the method of characteristics has been developed and the corresponding results are presented. A numerical method for studying the transition from a bore into a rarefaction wave with bottom friction and the surge on a dry bed is proposed. (Author)

AD-609 975 Div. 9
OTS Prices: HC $3.00/MF $0.50

Brown Univ., Providence, R. I.
AN ESTIMATE OF COMPRESSIBLE BOUNDARY LAYER DEVELOPMENT AROUND A CONVEX CORNER IN SUPERSONIC FLOW.
Rept. no. 6,
by B. L. Hunt and M. Sibulkin. Nov 64, 51p
Contract Nonr56235

Unclassified report

Descriptors: (*Supersonic flow, Boundary layer), (*Boundary layer, Compressible flow), (*Momentum, Supersonic flow), (*Numerical analysis, Momentum), Fluid flow, Pressure, Convex bodies, Thickness, Reynolds number, Hypersonic flow, Separation, Control, Volume, Turbulence, Fluid mechanics, Integral equations, Angle of attack.

An analysis of the effect of a sharp convex corner on the momentum thickness of a compressible, supersonic boundary layer flow is presented. The problem is attacked by a momentum integral technique in which an approximate pressure field is used. The shape factor is approximated by a simple expression which is also of general application. The main result of the analysis is an analytic expression for the ratio of the momentum thicknesses downstream and upstream of the corner. The results are also presented graphically over appropriate ranges of the major flow parameters. (Author)

AD-609 989 Div. 9
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif
A TURBULENT BOUNDARY-LAYER CALCULATION METHOD BASED ON THE LAW OF THE WALL AND THE LAW OF THE WAKE,
by D. M. Nelson. Nov 64, 48p
Task RUT03E000 216 1F008 06 02
NOTS TP3493; NAVWEPS 8510

Unclassified report

Descriptors: (*Turbulent boundary layer, Mathematical analysis), Wake, Axially symmetric flow, Integral equations, Bodies of revolution, Friction, Thickness,

Vector analysis, Shear stresses, Surfaces, Velocity, Energy, Drag.

The report presents the theoretical development of a method for calculating the incompressible turbulent boundary layer based on the 'law of the wall' and the 'law of the wake.' This development was carried out to provide a more rigorous solution of the boundary-layer equations for turbulent flow, in order to obtain an improved technique for estimating the inflow velocity profiles to propellers and the skin-friction drag of bodies of revolution.

AD-610 013 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

California Inst. of Tech., Pasadena.
STABILITY OF A CONDUCTING FLUID FLOWING DOWN AN INCLINED PLANE IN A MAGNETIC FIELD.
Technical rept.,
by Din-Yu Hsieh. Dec 64, 24p CIT-85-29
Contract Nonr22028, Proj. NR062 059
Unclassified report

Descriptors: (*Laminar flow, Stability), (*Magnetic fields, Fluid flow), Viscosity, Electrical conductance, Boundary layer.

A stability analysis is made for the laminar flow of a layer of a viscous and electrically conducting fluid down an inclined plane in a transverse magnetic field. It is found that the effect of the magnetic field, revealed through the Hartmann number, is to stabilize the flow. A simpler and physically clearer approximate treatment of the same problem based on the principle of local balance is also given. The results agree quite satisfactorily with the exact analysis. (Author)

AD-610 028 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

California Univ., Los Angeles.
AN EXPERIMENTAL STUDY OF LOW SPEED EDGETONES,
by Alan Powell and H. H. Unfried. Nov 64, 72p
UCLA-DE-64-49
Contract Nonr23362, Projs. RR009 01 01, NR062 229
Unclassified report

Descriptors: (*Fluid flow, Sound), (*Sound, Fluid flow), Acoustics, Jets, Wedges, Boundary layer, Noise, Test equipment, Experimental data, Graphics.

This experimental investigation of low speed jet edgetones was performed in connection with the development of the acoustic feedback theory first presented in 1953. Two jet edgetone systems are described. With these systems, variation in the breadth of the stream, the angle of the wedge, and the size of the wedge were made while measurements of edge distance, stream velocity, frequency, sound pressure level and the associated radiation pattern were performed, the exit velocity profile of the stream being controlled. The fluctuating force on the wedge has been measured simultaneously with the far field acoustic pressure, and the results confirm that the acoustic far field can be represented by an equivalent point dipole located in the region of the wedge and whose magnitude corresponds to the measured force. Richardson's 'crucial' experiment has been repeated and the result is consistent with the feedback theory. The experimental results concerning such features as the number of stages, minimum edge distance, and the size and shape of the obstacle are all consistent with the acoustic feedback theory. (Author)

AD-610 067 Div. 9
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ESTIMATE FOR THE PRESSURE ON RAPIDLY ACCELERATING BODIES IN HIGH-SPEED FLIGHT,
by J. D. Cole. Jan 65, 16p RM-4153-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Hypersonic flight, Slender bodies), (*Slender bodies, Aerodynamic characteristics), Airfoils, Bodies of revolution, Acceleration, Aerodynamic loading, Pressure, Shock waves, Deceleration, Mathematical analysis, Fluid mechanics.

The pressure on a slender accelerating airfoil or body of revolution traveling at high speed is estimated by using snowplow theory in a plane transverse to the direction of motion. With this theory a simple explicit expression is obtained for the pressure distribution on the body. The theory is valid for rapid accelerations and provides a quantitative estimate of the effect of acceleration on the air forces. The significant parameter measuring the effect is shown to be a Froude number, Fr = (body length) (acceleration) / sq (speed). The results from this analysis show that only in extreme cases does acceleration or deceleration exert an important effect on air forces. For example, a 50-ft missile accelerating 1000 g at Mach 4 has approximately 10 per cent larger wave resistance than one without acceleration. (Author)

AD-610 096 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Heliodyne Corp., Los Angeles, Calif.
MIXING AND FLUCTUATIONS IN A TURBULENT WAKE.
Research rept. no. 8,
by Andrew P. Proudian. Dec 64, 41p
Contract DA04 495AMC458Z, ARPA Order 360
Unclassified report

Rept. on Proj. Defender.

Descriptors: (*Wake, Turbulence), (*Aerodynamic configurations, Hypersonic characteristics), (*Fluid dynamic properties, Mathematical models), Fluid mechanics, Jet mixing flow, Transport properties, Diffusion, Convection, Time-lag theory, Reentry vehicles, Numerical analysis.

The structure of turbulent wakes of hypersonic bodies is argued to be largely controlled by the combined action of relatively large scale random convective motions, which introduce inhomogeneities in the wake core, and of molecular diffusion aided by turbulent distortions of fluid elements. A previously developed mathematical model representing turbulent wake mixing in terms of a mixing lag is discussed and qualitatively justified in terms of the above described mixing mechanism, and somewhat generalized. Numerical predictions for the magnitude and variation of mass density fluctuations in a relatively low speed wake are obtained by solving a simplified set of equations, in which the lag is represented by an effective mixing boundary, and are in encouraging agreement with the general magnitude and trend observed experimentally, although firm experimental measurements are lacking to-date. (Author)

AD-610 162 Div. 9, 15, 25
OTS Prices: HC $2.00/MF $0.50

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.

THEORY OF THE BOLTZMANN EQUATION,
by Harold Grad. Aug 64, 28p MF-40
Grant AF AFOSR62 266
AFOSR 64 1377
Unclassified report

Preprint of paper presented at International Congress of Applied Mechanics (11th) Munich, Aug 64.

Descriptors: (*Gas flow, Theory), (*Differential equations, Theory), (*Integral equations, Theory), Reviews, Fluid mechanics, Numerical analysis, Transport properties, Boundary value problems, Continuum mechanics.

A survey is presented of recent developments in the theory of the Boltzmann equation for a dilute monatomic gas. These advances are characterized by increased sophistication in mathematical techniques, improved understanding of the significance of older approximate results, and a general trend away from ad hoc and toward more precise mathematical procedures. In the singular limit of small mean free path, the traditional Hilbert and Chapman-Enskog expansions have been shown to be asymptotic to true solutions of the Boltzmann equation, but only when the variables are appropriately interpreted. At the opposite extreme of large mean free path where the behavior is again nonuniform, the precise mathematical singularities have been exposed. Over the whole range of linear problems the presence of a continuous spectrum in both the collision operator and the streaming operator points to the inadequacy of traditional exponential 'normal mode' expansions in both initial and boundary value problems. Results in all the regimes have been tied together by the overall qualitative understanding given by a more comprehensive existence theory which, for the first time, is broad enough to encompass the transition to macroscopic continuum flow. (Author)

AD-610 172 Div. 9, 27
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THRUST VECTORING WITH A PLUG NOZZLE BY PLUG TRANSLATION.
Master's thesis,
by William Joseph Barnes, Jr. Aug 64, 84p
GA/ME/64-1
Unclassified report

Descriptors: (*Thrust vector control systems, Plug nozzles), (*Plug nozzles, Thrust vector control systems), Rocket motor nozzles, Fluid dynamic properties, Jets, Boundary layer.

A theoretical and experimental investigation was made of a convergent plug exhaust nozzle to determine if thrust vectoring could be achieved through the use of a translating plug which traveled in plane motion across a base region of slightly increased diameter. The objectives were to determine the angle which the resultant thrust vector made with the axial direction when the plug was translated and, to determine the loss in axial plug wall thrust due to the step. The method of characteristics was applied to determine the theoretical pressure distribution over the plug wall contour of a basic Mach 2 plug nozzle with the plug in the fully translated position. To verify the above results the experimental study was made using a two-dimensional nozzle tested in cold flow. Good qualitative correlation was obtained between the method of characteristics solution and experimental results.

AD-610 173 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EFFECT OF VIBRATION ON HEAT TRANSFER FROM CYLINDERS IN FREE CONVECTION.
Master's thesis,
by David F. Neely. Aug 64, 75p GA/ME/64-2
Unclassified report

See also AD-292 335.

Descriptors: (*Cylindrical bodies, Heat transfer), (*Heat transfer, Cylindrical bodies), (*Vibration, Cylindrical bodies), Convection, Air, Temperature, Turbulent boundary layer, Interferometers.

The purpose was to determine the effect of diameter, temperature difference, and vibration intensity on the free convective heat transfer rate from horizontal cylinders subjected to transverse vibrations in air. The diameters of the cylinders were 0.085 and 0.25 inches. They were vibrated over a frequency range of 0 to 88 cycles per second and an amplitude range of 0 to 0.35 inches. The surface temperature ranged from 138 to 201 degrees Fahrenheit, and the maximum vibration intensity was 29 in./sec. Above vibration intensities of 12 in./sec, the variation of the heat transfer rate for both cylinders followed the forced convection curve recommended by McAdams, and the value of the heat transfer rate was independent of the temperature difference. For a given temperature difference and vibration intensity, the value of the heat transfer rate increased as the cylinder diameter decreased. An interferometer study showed that the boundary layer was turbulent above vibration intensities of 12 in./sec. (Author)

AD-610 174 Div. 9, 25
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECT OF AN ELECTRIC FIELD ON HEAT TRANSFER FROM A VERTICAL PLATE IN VARIOUS GASES OVER A RANGE OF PRESSURES.
Master's thesis,
by Richard James O'Brien. Aug 64, 104p
GA/ME/64-3
Unclassified report

Descriptors: (*Metal plates, Heat transfer), (*Heat transfer, Metal plates), (*Electric fields, Heat transfer), Gases, Pressure, Air, Nitrogen, Carbon dioxide, Programming (Computers), Pressure vessels, Tanks (Containers), Interferometers, Pigital computers, Electrostatics, Instrumentation.

The object was to study the effect an electric field has on heat transfer rate from a vertical flat plate in air, nitrogen, and carbon dioxide over a range of pressures. Equipment was designed and tests performed with a Mach-Zehnder type interferometer to obtain basic data on the effect of pressure on heat transfer coefficient at constant electrode-to-plate currents for vertical stations along the plate in air, nitrogen, and carbon dioxide. Correlations are obtained from these data and an empirical equation is derived relating heat transfer rate as linear functions of pressure and electrode-to-plate power. The accuracy of the equation is checked by the elimination of pressure as a parameter in the equation and plotting all of the data points obtained on one graph of heat transfer rate versus electrode-to-plate power. A dimensionless plot is also presented of Nusselt number versus the product of the Prandtl and Grashof numbers showing the effect of pressure on heat transfer coefficient at constant electrode-to-plate current. A digital computer was used to process the data taken with the interferometer.

AD-610 287 Div. 9
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.

DECELERATION AND MASS CHANGE OF AN ABLATING BODY DURING HIGH-VELOCITY MOTION IN THE ATMOSPHERE,
by Carl Gazley, Jr. Jan 65, 41p RM-4270-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Aerodynamic heating, Aerodynamic configurations), (*Aerodynamic configurations, Ablation), Deceleration, Transport properties, Heat transfer coefficients, Drag, Meteors, Spheres, Hypersonic flight.

This memorandum examines the factors affecting the dynamics and mass loss of ablating bodies moving at high velocities in a gaseous medium. The interdependent deceleration and rate of mass loss make the problem more complex than the simple case of deceleration of a body of constant mass. Although a solution exists for the classic meteor case with constant heat-transfer and drag coefficients, results have not been available for cases where these coefficients vary during the deceleration process, e.g., large bodies moving in the lower atmosphere. Some analytic solutions are presented for specific variations of the heat-transfer coefficient and suggests an approximation for other types of variations.

AD-610 292 Div. 9, 1
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THEORY OF A WING OF FINITE SPAN, OSCILLATING HARMONIOUSLY,
by N. N. Polyakhov. 4 Jan 65, 15p
FTD-TT-64-606
TT 65 61004

Unclassified report

Unedited rough draft trans. of Leningrad Univ. Vestnik (USSR) 1957, v. 12, no. 19, Seriya Matematiki, Mekhaniki i Astronomii, no. 4, p. 87-97.

Descriptors: (*Wings, Theory), (*Oscillation, Wings), Airfoils, Fluid dynamic properties, Harmonic analysis, USSR.

The present paper contains a generalization of Birnbaum-Kussner method which was developed for the case of an oscillating wing of an infinite span, on the case of a finite span.

AD-610 298 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wirght-Patterson AFB, Ohio.
ON NONLINEAR THEORY OF ORIGINATION OF TURBULENCE,
by E. M. Khazen. 12 Jan 65, 8p FTD-TT-64-698
TT 65 61010

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 153, no. 6, p. 1284-1287.

Descriptors: (*Turbulence, Nonlinear systems), Incompressible flow, Liquids, Statistical processes, Moments, Theory, Equations, Probability, USSR.

An hypothesis was introduced on the relationship between older moments of turbulent pulsations in order to formulate a closed system of equations to describe the origin and development of turbulence at certain pulsation amplitudes.

AD-610 323 Div. 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RADIAL-SLOTTED STREAM, FLOWING OUT FROM AN ANNULAR SOURCE OF FINITE DIAMETER,
by A. S. Ginevskii. 11 Jan 65, 12p FTD-TT-64-601
TT 65 61039

Unclassified report

Unedited rough draft trans. of Promyshlennaya Aerodinamika (USSR) 1962, no. 23, p. 72-79.

Descriptors: (*Annular nozzles, Laminar flow), (*Laminar flow, Numerical analysis), Turbulence, Fluid flow, Mathematical models, Differential equations, Numerical analysis, USSR.

An approximate solution for a problem concerning an outflowing laminary and turbulent stream from an annular source of finite radius is given and it is shown that when the radius of the annular source tends toward zero the obtained solution transforms into an asymptotic solution. The method used here can also be applied to solving a problem of radial-slotted internal stream, flowing out from an annular source in direction to its axis of symmetry.

AD-610 326 Div. 9, 13
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MAXIMUM PERMISSIBLE RATE OF STEAM FLOW THROUGH A SEPARATOR,
by N. A. Mozharov. 11 Jan 65, 10p
FTD-TT-64-682
TT 65 61042

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) 1961, v. 8, no. 4, p. 60-63.

Descriptors: (*Steam, Fluid flow), (*Moisture, Separation), Vapors, Vapor pressure, Steam power plants, Theory, Pressure, Mathematical analysis, USSR.

On the basis of experimental research formulas were derived for determining the critical rate for the stripping of a film and the maximum permissible load of film separators, taking into account not only the pressure but also the load on the perimeter of the separator from moisture. (Author)

AD-610 329 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
TEMPERATURE OF A CONE IN SUPERSONIC FLOW WITH CONSIDERATION OF RADIATION,
by I. N. Sokolova. 15 Jan 65, 12p FTD-TT-64-766
TT 65 61030

Unclassified report

Unedited rough draft trans. of mono. Sbornik Teoreticheskikh Rabot po Aerodinamike, Moscow, 1957, p. 222-229.

Descriptors: (*Conical bodies, Thermodynamics), (*Supersonic flow, Conical bodies), Thermal radiation, Thermal conductivity, Mathematical analysis, Aerodynamic heating, Surfaces, Temperature, USSR.

It is shown that the solution of laminary boundary equations on a cone with consideration of the radiation effect can be reduced to the solution of equations similar to corresponding equations for a plate. It is demonstrated that the radiation of an absolutely heat conductive cone is (sq. rt. 3)/2 from the radiation of an absolutely heat conductive plate, and absolutely nonconductive cone - approximately (with an accuracy of up to 2%) - (sq. rt. 3)/3 of the radiation of an absolutely non heat conductive plate. (Author)

AD-610 335 Div. 9, 22
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
THE FLOW FIELD BEHIND A SPHERICAL DETONATION IN TNT USING THE LANDAU-STANYUKOVICH EQUATION OF STATE FOR DETONATION PRODUCTS.
Final rept.,
by Morton Lutzky. 10 Dec 64, 43p NOLTR 64-40
Task NOL-428

Unclassified report

Descriptors: (*TNT, Detonations), (*Detonation waves, TNT), (*Equations of state, Gas flow), Shock waves, Explosive materials, Fluid mechanics, Mechanical waves, Spheres, Differential equations, Curve fitting, Explosion gases, Explosions.

Calculations were made of the flow field in the isentropic region behind a detonation wave in TNT, using the Landau-Stanyukovich equation of state for the detonation products (as described by Zeldovich and Kompaneets). Adjustable constants in this equation were evaluated by imposing ideal gas behavior on the detonation products in the large expansion (low density) limit, and by fitting to an experimental curve of detonation velocity versus loading density. Calculated values of Chapman-Jouguet variables correspond fairly well with experimental values at various loading densities, with the exception of the temperatures, which seem to be far too low. This is connected with the fact that the theory predicts an upper limit to the loading density at which an explosive will detonate; at this point the thermal energy vanishes and only the elastic energy contributes to the energy of detonation. (Author)

AD-610 338 Div. 9, 15
OTS Prices: HC $3.00/MF $0.75

Southwest Research Inst., San Antonio, Tex.
LINEARIZED, OSCILLATING, SUPERCAVITATING FLOW AT NONZERO CAVITATION NUMBERS.
Technical rept. no. 1,
by Wen-Hwa Chu. Dec 64, 56p
Contract NObs90344, Projs. SS600 000, 02 1546, Task 1719

Unclassified report

Descriptors: (*Cavitation, Fluid flow), (*Fluid flow, Mathematical analysis), Oscillation, Hydrofoils, Airfoils, Flutter, Linear systems, Lift, Moments, Tests, Theory, Measurement.

Parkin's theory of fully cavitated flow at nonzero cavitation numbers is modified and linearized. The modification lies in a corrected closure condition, taking into account the leading edge and cavity-end singularities. The linearized lift and moment expressions are derived for correlation with planned experiments which consist of measurements of the spanwise lift and moment distributions followed by flutter tests. (Author)

10. Fuels and Combustion

AD-609 889 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
THE STUDY OF THE ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Quarterly narrative progress rept. no. 11, 1 Jul-30 Sep 61,
by George A. Agoston and George M. Muller.
30 Sep 61, 4p
Contract AF49 638 565, Proj. 4759; ARPA Order 24 61 Task 2

Unclassified report

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustic properties), Sound, Propagation, Instrumentation, Photographic recording systems, Oscilloscopes.

Work was devoted to the development of a recording system which will allow the reading of the (filtered) pressure signal at accurate time intervals of as little as 10 micro sec, to an accuracy of about 0.5 per cent of peak pressure.

AD-609 890 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Narrative progress rept. no. 12, 1 Oct-31 Dec 61,
by George A. Agoston and George M. Muller.
31 Dec 61, 8p
Contract AF49 638 565, Proj. 4759, ARPA Order 24 61 Task 2

Unclassified report

See also AD-609 889.

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustic properties), Sound, Propagation, Instrumentation, Recording systems, Standards, Gas flow, Ignition.

Progress in the following areas is summarized: instrumentation, amplitude effect, preparation of standard sample, measurements in a moving air stream, preparations for measurements on burning surfaces.

AD-609 891 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Narrative progress rept. no. 13, 1 Jan-31 Mar 62,
by George A. Agoston and George M. Muller.
31 Mar 62, 9p
Contract AF49 638 565, Proj. 4759; ARPA Order 24 61, Task 2

Unclassified report

See also AD-609 890.

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustic properties), Sound, Propagation, Standards, Instrumentation, Recording systems, Surface properties.

Progress in the following areas is summarized: acoustic admittance of a standard sample, instrumentation for burning propellant tests, initial burning propellant experiments, obtaining the true admittance of a burning surface, spectral change in a plane acoustic pulse of finite amplitude.

AD-609 892 Div. 10, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ORIGIN AND PROPAGATION OF DISTURBANCES IN THE BURNING OF SOLID PROPELLANTS.
Narrative progress rept. no. 14, 1 Apr-30 Jun 62,
by George A. Agoston and George M. Muller. 30 Jun 62, 5p
Contract AF49 638 565, Proj. 4759; ARPA Order 24 61, Task 2

Unclassified report

See also AD-609 891.

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustic properties), Sound, Propagation, Test methods, Instrumentation.

Progress is reported on admittance measurements on cold samples by the reflected pulse method, and burning propellant experiments.

AD-609 899 Div. 10, 22, 30
OTS Prices: HC $5.00/MF $1.00

Toronto Univ. (Ontario).
AN EXPERIMENTAL INVESTIGATION OF SPHERICAL COMBUSTION FOR THE UTIAS IMPLOSION DRIVEN LAUNCHER.
Interim technical rept.,
by Andre Benoit. Oct 64, 154p
Contract AF33 657 7874, Proj. 7065, Task 7065 01
ARL 64 130

Unclassified report

Descriptors: (*Launching, Hypervelocity projectiles), (*Combustion, Launching), (*Combustion chamber gases, Launching), Combustion chambers, Oxygen, Hydrogen, Helium, Mixtures, Thermodynamics, Detonation waves, Test equipment, Instrumentation, Test methods, Flame propagation, Spheres, High-pressure research, Canada, Hypervelocity guns, Interior ballistics, Deflagration, Burning rate, Ignition.

An experimental investigation of the combustion processes occurring in the UTIA implosion driven hypervelocity launcher combustion chamber has been conducted in stoichiometric mixtures of hydrogen-oxygen diluted with an excess of hydrogen or helium. The mixtures were ignited using a spark gap or an exploding wire at the geometric center of the hemispherical vessel and piezo-pressure gauge histories were recorded for various dilutions and initial pressures ranging from 75 to 1000 psi. Heat transfer and ionization gauges were used to measure average combustion wave speeds and to investigate the wave symmetry. Calculations of the final conditions after complete combustion (constant volume combustion assuming no dissipative effects) have been done taking dissociations into account. The derived pressures have been compared with those obtained experimentally. (Author)

AD-610 106 Div. 10, 6, 14
OTS Prices: HC $3.00/MF $0.75

Electro-Optical Systems, Inc., Pasadena, Calif.
OPTICAL TRANSMITTER TECHNIQUES.

Quarterly progress rept. no. 1, 15 Apr-15 Jul 64,
by M. L. Bhaumik and L. J. Nugent. Dec 64, 58p
EOS-5180-Q-1
Contract AF30 602 3440, Proj. 4506, Task 450608
RADC TDR64 442

Unclassified report

Descriptors: (*Lasers, Materials), (*Oscillators, Lasers), Rare earth compounds, Complex compounds, Fluorescence, Sensitivity, Diffusion, Test equipment, Photons, Heat exchangers, Aromatic compounds, Atomic energy levels, Radar transmitters, Optical instruments.

The report describes work directed toward the design and fabrication of a gas laser oscillator and a solid-state chelate laser operating at wavelengths ranging from 5.0 to 0.3 microns. New classes of sensitized fluorescence and their sensitizers were investigated and system efficiency was improved through sensitizer purification. Some of the new sensitized systems investigated show promise of operation at or above room temperature. The scientific basis for sensitized fluorescence is clarified through a detailed analysis and description of the mechanism of energy transfer. Appropriate laser calculations and optimization were accomplished and associated laser test cavities, heat exchangers, and other equipment were built in preparation for testing the new materials. (Author)

AD-610 144 Div. 10, 26
OTS Prices: HC $3.00/MF $0.75

Reaction Motors Div., Thiokol Chemical Corp.,
Denville, N. J.
HYPERGOLIC IGNITION AT REDUCED PRESSURES.
Progress rept. for 1 May-30 Sep 64,
by A. Corbett, T. Seamans, B. Dawson, and C. Cheetham.
Dec 64, 80p
Contract AF04 611 9946, Proj. 3058, Task 3058442
RPL TR64 175

Unclassified report

Descriptors: (*Hypergollic rocket propellants, Ignition), Ignition lag, Fuel injection, Fuel additives, Oxidizers, Nitrogen compounds, Oxides, Nitric acid, Hydrazine derivatives, Dimethyl hydrazine (1-1), Vacuum.

The report covers the first five months of a ten-month experimental investigation of the ignition of hypergolic propellants at reduced pressures. Unconfined impingement tests are being conducted in a large vacuum chamber in order to define an ignition model for hypergolic propellants and to investigate concepts for reducing ignition delay and resultant pressure spikes. The test setup, experimental program schedule, and concepts for reducing ignition delay are discussed. Results are reported on ignition delay as a function of injection parameters, environmental conditions and concepts such as injector modifications and propellant additives for reducing delay for tests performed with N_2O_4 and IRFNA as oxidizers and hydrazine-type fuels. (Author)

AD-610 250 Div. 10, 25
OTS Prices: HC $2.00/MF $0.50

Thiokol Chemical Corp., Elkton, Md.
EXPERIMENTS FOR THE MEASUREMENT OF THE ACOUSTIC IMPEDANCE OF A BURNING SOLID PROPELLANT.
Quarterly technical rept. no. 4, 15 Feb-15 May 62,
by Edward S. Stern and Alvin O. Converse. 6 Jul 62,
36p E98-62
Contract Nonr347300, ARPA order 23 61, Task 5
N62 13681

Unclassified report

See also AD-610 260.

Descriptors: (*Solid rocket propellants, Acoustical impedance), (*Combustion, Solid rocket propellants), Stability, Test equipment, Microphones, Ignition, Combustion chambers, Noise.

The report describes the progress of a program to measure the acoustic impedance of a burning solid propellant. The analytical treatment to compensate for the introduction of exhaust ports in the sound chamber body is presented. Specific impedance measurements for Johns-Manville Airacoustic using various test chambers are reported. Impedance measurements at elevated pressures are discussed. At present, passive tests have been conducted at 14.7, 500 and 1,000 psi to establish the test procedure and acceptability of the data in various modified sound chambers. The reduced data at one atmosphere confirm the acceptability of the method. Data reduction at 500 and 1,000 psi is now being performed. Propellant samples were fired in some of these chambers to allow the measurement of pressure rise upon ignition. A supplementary bibliography of applicable references is included as an appendix to this report. (Author)

AD-610 258 Div. 10, 25
OTS Prices: HC $2.00/MF $0.50

Thiokol Chemical Corp., Elkton, Md.
EXPERIMENTS FOR THE MEASUREMENT OF THE ACOUSTIC IMPEDANCE OF A BURNING SOLID PROPELLANT.
Quarterly technical rept. no. 1, 15 May-15 Aug 61,
by E. S. Stern, J. R. Woodyard, and A. O. Converse.
5 Oct 61, 40p E149-61
Contract Nonr347300, ARPA Order 23 61

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustical impedance), (*Combustion, Solid rocket propellants), Stability, Boundary layer, Equations, Test equipment, Combustion chambers.

The report describes progress made during a research program to measure the acoustic impedance of a burning solid propellant. Equipment needed to conduct experiments designed to yield information about the mechanism and conditions of combustion instability was fabricated. Equations were used to establish the desired boundary conditions and to serve as a basis for further investigations. The limitations and assumptions used in deriving these equations are discussed. Results of preliminary experiments using this apparatus are presented. (Author)

AD-610 260 Div. 10, 25
OTS Prices: HC $2.00/MF $0.50

Thiokol Chemical Corp., Elkton, Md.
EXPERIMENTS FOR THE MEASUREMENT OF THE ACOUSTIC IMPEDANCE OF A BURNING SOLID PROPELLANT.
Quarterly technical rept. no. 3, 15 Nov 61-15 Feb 62,
by Edward S. Stern, James R. Woodyard, and Alvin O. Converse. 19 Mar 62, 36p E47-62
Contract Nonr347300, ARPA Order 23 61, Task 5
N62 10406

Unclassified report

Descriptors: (*Solid rocket propellants, Acoustical

impedance), (*Combustion, Solid rocket propellants), Stability, Combustion chambers, Test equipment, Transducers, Microphones, Bibliographies.

The report describes the progress made during a research program to measure the acoustic impedance of a burning solid propellant. The acoustic impedance of acoustical materials can be determined with the present instrumentation. Data obtained using the Elkton test chamber are compared with typical data obtained from the literature. Variations due to mounting and thickness of test specimens are discussed. Details of the microphone and sound driver performance are presented. Linearity tests of the equipment have indicated possible operational problems which must be checked further. A supplementary bibliography of applicable references is included as an appendix to the report. (Author)

AD-610 290 Div. 10, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF THE POSSIBILITY OF OBTAINING GAS TURBINE FUEL FROM THE PRODUCTS OF CATALYTIC CRACKING AND COKING,
by O. I. Svetozarova, V. V. Zhdanova, and E. P. Levashova. 23 Dec 64, 11p FTD-TT-64-594
TT 65 61002

Unclassified report

Unedited rough draft trans. of Groznenskii Neftyanoi Nauchno-Issledovatel'skii Institut. Trudy (USSR) 1963, v. 12, p. 61-68.

Descriptors: (*Gas turbines, Fuels), (*Fuels, Pyrolysis), (*Pyrolysis, Fuels), Catalysis, Petroleum, Distillation.

The study of the properties of distilled and residue fuels, is being carried on by the different Russian research organizations. The work is devoted to the study of the physical and chemical properties of distillates, obtained in catalytic cracking of gas oils at the Grozny refineries and the products from contact coking of heavy petroleum residues. The following conclusion were reached: (1) The distillates obtained in catalytic cracking of light raw material, can be used as low-ash, low-congealing components of the fuels for gas turbines. The yield of distillate fuels amounts to 43 to 52.5% of the cracked raw material. (2) For getting light, low-ash gasturbine fuels with traces of vanadium, the process of coking heavy petroleum residues, should be accomplished with recirculation. (3) In contact coking of raw material with recirculation of the sulfurous pitch, tar and cracking residue, the yield of low-ash gasturbine fuel, amounted to 45, 56.2, and 64.4%.

11. Ground Transportation Equipment

AD-610 328 Div. 11
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW TYPE OF TRANSPORTERS OF GREATER LOAD LIFTING CAPACITY,
by L. I. Gorshkov and L. D. Kuz'mich. 9 Jan 65, 9p
FTD-TT-64-685
TT 65 61044

Unclassified report

Unedited rough draft trans. of Zheleznodorozhnyi Transport (USSR) 1964, v. 46, no. 1, p. 37-39.

Descriptors: (*Railroad cars, USSR), Load distribution, Loading (Mechanics), Cantilever beams.

The need in Russia to transport, by rail, machines of exceedingly heavy weight led to coupled transportation in which transported items appear to be a component part of the main carrier structure. Such rolling stock has two basic parts (possibly of cantilever framework) between which the transported object is suspended. This permits the permissible height of the load to increase. By the use of this principle, the Lugansk Oktyabrskaya Revolutsiya Locomotive Plant designed and constructed in 1960-1961, in cooperation with the Voronezh bridge building plant, experimental samples of such rolling stock that were intended for the transportation of heavy-duty transformers and stators of large turbogenerators which could not be transported on flat cars because of their dimensions.

12. Guided Missiles

AD-609 926 Div. 12, 17
OTS Prices: HC $6.00/MF $1.50

Rocketdyne, Canoga Park, Calif.
FEASIBILITY INVESTIGATION OF A MOVING BELT RADIATOR.
Quarterly progress rept. no. 3, 10 Sep - 9 Dec 64, Jan 65, 268p Rocketdyne-R-5670-3
Contract AF33 615 1576

Unclassified report

See also AD-607 292.

Descriptors: (*Radiators, Spaceborne), Feasibility studies, Optimization, Heat transfer, Thermal conductivity, Antifriction bearings, High temperature research, Vacuum, Model tests, Heat resistant materials, Tests.

This report covers the third quarter of a continued research program on the feasibility of a novel concept for the rejection of waste heat in space, the moving belt radiator. Chief concerns of the program are materials compatibility, thermal conductance between surfaces, and antifriction bearing operation, all at high temperature in a hard vacuum. During this report period, the materials compatibility and heat transfer investigations in the reciprocating-contact testers were continued; the first of two new bearing test rigs was assembled and the first bearing test was initiated; modifications to the small-scale model were completed and several successful tests were completed; and analytical optimization studies of the belt radiator were continued. (Author)

AD-609 969 Div. 12, 20, 21
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
ANALYSIS OF RADIATORS FOR SPACE NUCLEAR POWER SYSTEMS.
Technical note,
by Roy W. Blanton, Jr. Dec 64, 48p
BrownEng-R-125
Contract NAS8 5289

Unclassified report

Descriptors: (*Radiators, Spacecraft), (*Nuclear power plants, Cooling and ventilating equipment), (*Spacecraft, Nuclear power plants), Heat transfer, Thermal radiation, Protective coverings, Vulnerability, Meteorites, Penetration, Surface temperatures, Conical bodies, Flat plate models, Optimization, Fluid flow, Thermal conductivity, Heat exchangers, Programming (Computers), Space environmental conditions, Liquid metals, Programming languages.

A theoretical analysis is presented for designing heat radiators for space nuclear power systems. The analysis is for two configurations: conical, single-surface radiators and flat, tapered plate radiators. Both condensing and noncondensing fluid conditions are considered. A FORTRAN IV program is included. (Author)

AD-610 043 Div. 12, 7
OTS Prices: HC $7.40/MF $2.25

Garrett Corp., Phoenix, Ariz. AiResearch Mfg. Div.
CLOSED-BRAYTON-CYCLE SOLAR-POWER-UNIT RESEARCH AND DEVELOPMENT PROGRAM.
Rept. for May 63-May 64,
by A. Pietsch. Dec 64, 440p
Contract AF33 657 11721. Proj. 3145, Task 314502
APL TDR64 103

Unclassified report

Descriptors: (*Spacecraft, Power supplies), (*Power supplies, Solar radiation), (*Solar radiation, Electric power production), (*Brayton cycle, Electric power production), Energy conversion, Solar panels, Thermodynamic cyles, Heat transfer, Generators, Turbines, Compressors, Gas bearings, Radiators, Design, Coolants, Inert gases, Diffusers, Optimization, Heat exchangers, Manifolds (Engines), Thermodynamics, Lithium compounds, Fluorides.

Four problem areas considered critical to the use of a closed Brayton cycle for a solar-powered space power system were reviewed and experimental investigations were conducted thereon to define potential problems. Analyses and experimental testing were conducted to verify that small radial compressors can be made to operate successfully on monatomic gas. The feasibility of using hydrostatic, porous-shoe, flexibly mounted gas bearings was evaluated by testing on a single-shoe and a dynamic two-bearing test rig. Testing was conducted on a single-tube test rig to determine the friction and heat-transfer characteristics of internally finned tubes. Two radiator sections were deployed under simulated space conditions to show that a low-redundancy, efficient deployment mechanism can be designed and utilized. A lithium-fluoride hot-fill technique was developed to fill a complex cavity consisting of thin closely spaced (0.040-inch) fins.

AD-610 208 Div. 12, 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
VARIATIONAL PROBLEM OF ESCAPE FROM CIRCULAR ORBIT,
by V. N. Lebedev. 5 Dec 64, 10p FTD-TT-64-1200
TT 65 608765

Unclassified report

Unedited rough draft trans. of Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki (USSR) 1963, v. 3, no. 6, p. 1126-1130.

Descriptors: (*Circular orbit trajectories, Calculus of variations), (*Calculus of variations, Circular orbit trajectories), Equations, Motion, Thrust, Acceleration, Fuel consumption, Orbital trajectories, Optimization, Mathematical analysis, Boundary value problems, Differential equations, Integration, Velocity, Maneuvering satellites, Satellites (Artificial), Transfer trajectories, USSR.

A precise solution of the variational problem of escape of a space vehicle with a continuously operating engine is presented. It is demonstrated that the escape time from a circular orbit using tangential thrust differs by less than one per cent from the time obtained from a precise solution of the variational problem. Lawden's assumption concerning the character of optimum control for the case of small thrust proves invalid.

AD-610 229 Div. 12, 9, 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
VIBRATIONAL ANALYSIS OF A FREE-FREE BEAM SUBJECTED TO AN AXIAL LOAD.
Master's thesis,
by Franklin E. Eastep. Aug 63, 85p GAE/Mech-63-8

Unclassified report

Descriptors: (*Vibration, Beams (Structural)), (*Beams (Structural), Loading (Mechanics)), (*Guided missiles, Vibration), Thrust, Guidance, Moment of inertia, Shear stresses, Deflection, Structural parts, Cantilever beams, Numerical analysis, Equations, Motion, Differential equations, Programming (Computers), Matrix algebra.

Transverse vibrations in one plane of a non-uniform free-free beam are considered, which include the effects of rotary inertia, shear deflection, and an axial thrust applied at one end of the beam. A matrix of stiffness coefficients is obtained for an axially-loaded beam element. The equations of motion for free vibration of cantilever and free-free nonuniform beams are derived by using matrices and the definition of stiffness coefficient. A digital computer program is included which may be used for the numerical calculation of mode shapes and frequencies of vibration. Frequencies of vibration are calculated for a free-free beam and an axially loaded cantilever beam. (Author)

AD-610 230 Div. 12, 9, 25
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TRANSVERSE VIBRATIONS OF NON-UNIFORM, FREE-FREE BEAMS.
Master's thesis,
by William F. Bozich. Aug 62, 169p GAE/Mech-62-4
Unclassified report

Descriptors: (*Vibration, Beams (Structural)), (*Beams (Structural), Vibration), (*Guided missiles, Vibration), Thrust, Guidance, Moment of inertia, Shear stresses, Deflection, Acceleration, Buckling (Mechanics), Energy, Structural parts, Numerical analysis, Equations, Motion, Matrix algebra, Operators (Mathematics), Iterative methods.

Transverse vibrations in one plane of a non-uniform, free-free beam are considered, which include the effects of rotary inertia, shear deflection, and a constant axial acceleration, which is provided by an axial thrust at one end of the beam. The equations of motion are derived. An energy formulation for approximate solution of the natural frequencies, and a matrix formulation for the approximate solution of the natural frequencies and mode shapes are derived, which include these effects. Both formulations are altered to give the critical axial acceleration for buckling. It is shown that rotary inertia, shear deflection, and axial acceleration all reduce the natural frequency of vibration, however the first two effects are important in short beams, while the latter effect is important in long slender beams.

AD-610 231 Div. 12, 15
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
VELOCITY AND TIME REQUIREMENTS FOR ORBITAL TRANSFER AND RENDEZVOUS.
Master's thesis,
by Tom Jennings Forster and Lawrence Lee Gooch.
Aug 64, 104p GA/Mech-64-3
Unclassified report

Descriptors: (*Transfer trajectories, Nomographs), (*Nomographs, Transfer trajectories), (*Rendezvous trajectories, Nomographs), (*Maneuvering satellites, Transfer trajectories), Orbital trajectories, Elliptical orbit trajectories, Inclined orbit trajectories, Mathematical models, Rendezvous spacecraft, Manned spacecraft, Feasibility studies, Optimization, Perturbation theory, Celestial mechanics, Equations, Velocity, Numerical analysis, Operations research, Programming languages, Digital computers, Air Force.

A nomographical technique is presented for determining the total velocity increment and time required to complete an orbital transfer between two elliptical orbits in the same gravitational sphere of influence. The general case of non-coaxial, inclined, elliptical orbits is considered. The problem is simplified into a pseudo-coplanar problem by making the plane change at the line of nodes. The mathematical model used is based on unperturbed conic sections and instantaneous velocity impulses. The elements of the transfer ellipse are derived in terms of the orbital parameters of the initial and final orbits. The departure point, arrival point, and change in flight path angle at departure or arrival are the independent variables. The solution to the problem is portrayed on a set of nomographs which provides answers of sufficient accuracy for the initial planning of a mission. The report also includes investigations of timing control and velocity optimization. A time matching technique is presented for the selection of the transfer path necessary to rendezvous.

AD-610 232 Div. 12
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
MAXIMUM STABLE ORBIT OF A DISTANT LUNAR SATELLITE.
Master's thesis,
by Jerry Eugene White. Jul 64, 116p GA/Mech-64-2
Unclassified report

Descriptors: (*Lunar satellites, Motion), (*Orbital trajectories, Lunar satellites), Moon, Elliptical orbit trajectories, N-body problem, Lunar trajectories, Celestial mechanics, Programming (Computers), Equations, Integration, Stability.

The general nature and limits of motion of a distant lunar satellite in a retrograde orbit are investigated. The equations of motion are those of the restricted three-body problem and are written considering a circular orbit for the moon about the earth. The general motion is distinctly different from that of a close satellite and closely resembles the cross section of the exact sphere of influence. What is defined as the exact sphere of influence of the moon is not actually a sphere, but it resembles an ellipsoid displaced slightly away from the earth. The maximum distance from the moon for a stable orbit was found to be about 43,000 statute miles. The maximum initial radius at injection varied in proportion to the sphere of influence radius. The effect of the eccentricity of the moon's orbit on the distant satellite was to make the orbit considerably more sensitive to changes in initial radius and to slightly reduce the maximum orbital radius and maximum initial radius.

AD-610 238 Div. 12, 15
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN ERROR ANALYSIS OF LUNAR RETURN TRAJECTORIES.
Master's thesis,
by Richard L. Hepburn. Jan 63, 71p GAW/Mech-62-14
Unclassified report

Descriptors: (*Lunar trajectories, Numerical analysis), (*Trajectories, Errors), (*Optimization, Lunar trajectories), (*Descent trajectories, Optimization), Reentry vehicles, Velocity, Celestial mechanics, Interplanetary trajectories, Launching, Boundary value problems, Atmosphere entry, Sensitivity, Ballistics,

Perturbation theory, Guided missile trajectories, Programming languages, Digital computers.

The sensitivities of ballistic lunar return trajectories to errors in burnout flight path angle and velocity are examined. Only those trajectories which re-enter the atmosphere at a shallow flight path angle in the vicinity of the 're-entry corridor' have been included. The derivations included are based on a stationary earth-moon system and employ the sphere of influence concept. The calculations were done on an IBM 1620 Digital Computer. A listing of the computer programs is included. It was found that the shallower the re-entry angle the more sensitive the trajectory. The sensitivities to angular error increase with increasing burnout velocity while the sensitivities to velocity error decrease. A launch location was found at which the sensitivity to velocity error was essentially zero. This location was suspect because of the assumptions, but it was concluded that there were launch locations with minimum guidance requirements. (Author)

AD-610 281 Div. 12, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
REVIEW OF THE THIRD MANNED SPACE FLIGHT MEETING,
by Deane N. Morris. Jan 65, 20p P-3051
Unclassified report

Prepared for publication in Astronautics and Aeronautics.

Descriptors: (*Space flight, Manned), (*Symposia, Space flight), (*Astronautics, Operations research), Lunar probes, Lunar craft, Lunar bases, Spacecraft, Rendezvous satellites, Spacecraft docking, Safety, Mars probes, Reentry vehicles, Manned spacecraft.

The Third Manned Space Flight Meeting, sponsored jointly by the AIAA and NASA, was held in Houston in November 1964. The Mercury, Gemini, and Apollo programs were discussed. Special emphasis was given to advanced planning for the manned space program in the post-Apollo period. The three areas of major manned effort after the initial landings on the moon are (1) extensions of the lunar program to include exploration and exploitation of the lunar surface, (2) development of earth orbital operations, and (3) a manned interplanetary program, probably directed initially at Mars.

AD-610 307 Div. 12, 32
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE ECONOMICS OF PREVENTIVE MAINTENANCE OF MISSILE GROUND SUPPORT EQUIPMENT,
by Erich G. Pieruschka. 19 Dec 58, 30p
LMSC-450753
Unclassified report

Descriptors: (*Guided missiles, Ground support equipment), (*Ground support equipment, Reliability), (*Maintenance, Ground support equipment), (*Economics, Ground support equipment), Costs, Statistical analysis, Optimization, Statistical functions.

This study is an examination of the economics of the preventive maintenance of missile ground support equipment. Several maintenance cost factors are defined and are systematically varied to show their effect in their application to preventive maintenance. The influence of these cost factors is examined. A simple formula for estimating the most economical and effective replacement time for preventive maintenance is shown. The replacement time formula offered in the conclusions provides a practical method for establishing optimum missile maintenance reliability. (Author)

AD-610 308 Div. 12
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
FAILURE CATEGORIES OF GUIDED MISSILES,
by Erich G. Pieruschka. 1 Jun 59, 44p
LMSC-450941
Unclassified report

Descriptors: (*Failure (Mechanics), Guided missiles), (*Guided missiles, Reliability), Guided missile components, Tests, Mathematical prediction, Optimization, Statistical analysis, Statistical distributions, Statistical functions.

This study is concerned with the different kinds of failures which may occur in guided missiles. It discusses catastrophic and non-catastrophic failures; the degree of dependence in the occurrence of failures; the rules governing the reliability of guided missiles as a function of the reliability of the single components; and the confidence of the system reliability when such determination rests upon a finite number of tested units of each type of component. (Author)

13. Installations and Construction

AD-609 981 Div. 13, 1, 33
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CONSTRUCTION OF A SNOW RUNWAY AT CAMP CENTURY FOR WHEEL LANDINGS WITH LIGHTWEIGHT AIRCRAFT.
Special rept.,
by Gunars Abele. Aug 64, 10p
CRREL SR62

Unclassified report

Descriptors: (*Runways, Snow), (*Snow, Trafficability), (*Landing fields, Greenland), All-weather aviation, Terminal flight facilities, Landings, Aircraft, Arctic regions, Construction, Civil engineering.

Use of wheeled aircraft on the Greenland Ice Cap, particularly for support of Camp Century, may present certain advantages in view of the difficulties encountered with skis on the 'Caribou' type aircraft during 1962. During June, July, August, and September, when the support requirements of Camp Century are quite heavy, between 60 and 70% of the time is suitable for flying. A snow runway capable of supporting wheel landings with lightweight aircraft would be required. The construction of such a runway appears to be within the capability of the U. S. Army Polar Research and Development Center, with U. S. Army Cold Regions Research and Engineering Laboratory providing technical assistance. The following discussion describes briefly the type of runway required, the method of construction, the effort involved, and suggested maintenance of the runway. (Author)

AD-610 143 Div. 13
OTS Prices: HC $1.00/MF $0.50

Dartmouth Coll., Hanover, N. H. Dept. of Civil Engineering.
FLEXURAL PROPERTIES OF SNOW AND SNOW-ICE.
Special rept.,
by S. Russell Stearns. Oct 64, 20p
Contract DA11 190eng32
CRREL SR59

Unclassified report

Descriptors: (*Snow, Mechanical properties), (*Ice, Mechanical properties), Elasticity, Deformation, Trafficability, Ice islands, Crystal structure, Density, Loading (Mechanics), Temperature, Experimental data, Graphics, Numerical methods and procedures, Civil engineering.

One testing objective was to determine if small, select samples of natural snow-ice, tested in bending, would provide consistent and higher values for the flexural strength and modulus of elasticity. Another objective was to investigate the surface bearing properties of snow-ice layers, formed during winter on lakes or rivers, which are often separated from clear ice by an interlayer of slush or water. The apparatus used in testing the snow-ice was a modification of a Soiltest hand-operated press with a 0- to 5000-lb wooden, three-point load device. Dense snow-ice at +5 degrees had high flexural strength (avg. 347.5 psi) and a high modulus of elasticity (avg. 6.08 x 100000 psi), probably the result of a large, interlocking crystal structure. The apparent relationship between modulus of elasticity and density of snow-ice is affected by the rate of loading and temperature. There appears to be a relationship between density and flexural strength for snow, snow-ice, and high-density snow in the natural undisturbed state; but processing, including snow compaction, lowers the tensile strength at early ages. The formulas used in computations are given and test results are tabulated and summarized. (Author)

AD-610 201 Div. 13
OTS Prices: HC $3.00/MF $0.75

Arctic Construction and Frost Effects Lab., Corps of Engineers, Boston, Mass.
THE THEORETICAL ANALYSIS OF DRAINAGE OF BASE COURSES. APPENDIX I. SUBSURFACE DRAINAGE INVESTIGATION, 1945 - 1946,
by Louis A. Pipes. Mar 46, 60p
ACFEL-TR-5, App. 1

Unclassified report

Appendix 1 to comprehensive rept. dated Sep 46.

Descriptors: (*Hydrology, Drainage), (*Drainage, Soil mechanics), (*Soil mechanics, Drainage), Gravity, Fluid flow, Water, Mathematical analysis, Graphics, Civil engineering.

The purpose of the first part of this report is to review the present status of the theory of two and three dimensional motion of ground water with a free surface and to investigate the possibilities of applying modern instruments of calculation to the determination of the shape of the free surface, the extent of the surface of seepage and other pertinent data of importance in gravity flow systems. A comprehensive review of the existing literature is included in order that subsequent investigations may be facilitated by this report. The second part of the report is devoted to the calculation of rates of drainage of base courses by assuming approximate geometrical shapes for the free surface during the process of drainage. The various rates of drainage obtained by these approximations are compared with each other and with experimental tests conducted at the soil laboratory.

AD-610 225 Div. 13
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LUNAR EXCAVATION TECHNIQUES IN ROCK.
Master's thesis,
by Joseph John O'Kobrick. Aug 64, 125p
GSF/Mech-64-38

Unclassified report

Descriptors: (*Earth-handling equipment, Lunar environment), (*Lunar environment, Earth-handling equipment), (*Civil engineering, Lunar environment), Moon, Extraterrestrial topography, Rock (Geology), Drilling machines, Blast, Explosive materials, Nuclear energy, Industrial equipment, Machines, Lunar bases, Mechanical engineering.

Excavation techniques are studied to determine suitable methods for excavating rocks, like basalt, on the moon under lunar environmental conditions. Desired features are low weight, versatility, reliability, and efficiency. Areas considered are drilling, blasting and rock moving. A down-the-hole, rotary-percussive tool appears to be the most suitable drill. Other possibilities are shaped charge, rotary, percussive, and shot drills. Chemical high energy and nuclear explosives are examined for blasting effectiveness. Multiple hole placement of chemical explosives has considerable utility, while nuclear devices can excavate larger quantities of rock with less payload. Suitable rock moving equipment includes cable-controlled dragline buckets, lightweight hoes, tractor-shovels, bulldozers or dozer-rippers, and conveyor belts. Recommendations for further study are given. (Author)

AD-610 227 Div. 13
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECTS OF GRAVITY ON THE BEARING CAPACITY OF COHESIONLESS SOILS.
Master's thesis,
by James Edward Lynch and Cornelius Joseph Higgins.
Aug 64, 126p GSF/Mech-64-33

Unclassified report

Descriptors: (*Soil mechanics, Lunar environment), (*Lunar environment, Soil mechanics), (*Gravity, Soil mechanics), Lunar bases, Moon, Soils, Simulation, Engineering geology, Trafficability, Test methods, Jet planes, Gravity (Artificial), Experimental data, Theory.

In this study the effect of gravity on the strength of cohesionless soils is investigated. In particular, the effect of gravity on the bearing capacity of footings on cohesionless soils is considered. Coulomb's equation for shearing strength and Terzaghi's bearing capacity theory are analyzed to determine theoretically the influence of gravity. Penetrometer experiments were performed on six soil models under gravity forces of 0, 0.168, 1, and 2 times that of the earth using an Air Force KC-135 jet aircraft. The experimental results show that the ultimate bearing capacity of cohesionless soils is directly proportional to the gravity field. This is the result predicted on the basis of Terzaghi's bearing capacity theory. (Author)

AD-610 279 Div. 13, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A METHOD OF DAMPING VIBRATIONS IN STRUCTURAL ELEMENTS,
by Yu. A. Lebedev. 18 Dec 64, 4p FTD-TT-64-752
TT 65 60985

Unclassified report

Unedited rough draft trans. of Russian patent 150723 (appl. no. 754165/25-8, 2 Dec 61).

Descriptors: (*Structural parts, Vibration), (*Vibration, Damping), Structural properties, Welding, Joining, Loading (Mechanics), Joints, Mechanical properties, Friction, Patents, USSR.

A method was devised of damping vibrations in structural elements, including the operation of separating them into sections or putting them together out of separate parts and also the operation of creating on the conjugate surfaces of these parts contact pressures which bring into existence the process of dry friction under strain or vibrations. The invention is distinguished by the fact that there is imparted to areas of the part or the structural element one or several curvatures and these are joining into one whole by surfaces bent in different directions.

AD-610 337 Div. 13, 25
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
ON THE EFFECTS OF STRESS-WAVE DIFFRACTION ON GROUND-SHOCK MEASUREMENTS: PART I,
by C. C. Mow. Jan 65, 60p RM-4341-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Underground structures, Shock waves), (*Shock waves, Underground structures), (*Mechanical waves, Scattering), Stresses, Mathematical analysis, Spheres, Motion, Loading (Mechanics), Elasticity, Measurement, Integral transforms.

This memorandum presents an exact solution of the response of a rigid spherical object (inclusion) embedded in an elastic medium subjected to ground shock. The Fourier-transform method was used to determine the transient response of the spherical inclusion. It was found that the inclusion motion differs substantially from the free-field motion, both in acceleration and velocity. A slight change in displacement was also observed. The effect of geometry on the response of an inclusion was also investigated briefly. It was shown that the frequency response of a cylindrical inclusion is quite similar to that of the spherical inclusion. On the basis of these study results, it is believed that a substantial error could occur in shock measurements due to stress-wave-diffraction phenomena. (Author)

AD-610 342 Div. 13, 22
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SCIENTIFIC TECHNOLOGICAL MINING SOCIETY: BLASTING: SELECTED ARTICLES,
by B. Ya. Svetlov, F. M. Galadzhii, V. I. Zenin, and B. I. Vaynshtein. 22 Dec 64, 27p FTD-TT-64-447
TT 65 61036

Unclassified report

Unedited rough draft trans. of Vzryvnoe Delo (USSR) 1963, no. 52/9, p. 57-67.

Descriptors: (*Aluminized explosives, Detonations), (*Explosive materials, Detonations), (*Detonations, Velocity), (*Mining engineering, Detonations), USSR, Measurement, Oscillographs, Ammonium compounds, Nitrates, TNT.

'Some detonation characteristics of aluminum-containing substances,' by B. Ya. Svetlov: Experiments were performed on samples of ammonal (stoichiometric mixtures of ammonium nitrate with trinitrotoluene and aluminum powder) having different contents and dispersions of aluminum. The results showed that the difference in the rate of burning of the aluminum was not reflected in the rate of detonation of the ammonals (including those without trinitrotoluene) in charges of high enough diameter. The conclusion is that the rate of detonation of ammonals decreases with substitution therein of trinitrotoluene by aluminum. 'Perfecting the methods of measuring the speeds of detonations,' by F. M. Galadzhiy, V. I. Zenin and B. I. Vaynshteyn: Methods are described for measuring the speed of detonation of explosive charges by which there are employed the oscillographs OK-17M and IV-13M.

14. Materials (Non-Metallic)

AD-609 952 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Olin Mathieson Chemical Corp., New Haven, Conn.
DEVELOPMENT OF A FIRE-RESISTANT WATER-BASE HYDRAULIC FLUID.
Bimonthly progress rept. no. 4, 1 Nov - 31 Dec 64,
by E. H. Kober and G. F. Ottmann. 11 Jan 65, 23p
Contract NObs90268

Unclassified report

See also AD-607 948.

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), Phenols, Chlorine compounds, Ethylene oxide, N-heterocyclic compounds, Amines, Alcohols, Flammability, Flames, Viscosity, Ignition, Temperature, Solubility.

Alkoxylation studies of 2, 4-toluylene diamine, hydroxy diphenyl oxide, oxydianiline, 4, 4'-methylene bis 2-chloroaniline, Bis phenol A, and N, N'-diphenyl p-phenylene diamine with ethylene oxide and glycidol in different mole ratios were completed. As a result, compositions of those alkoxylation products which provide for the lowest possible viscosities of their aqueous solutions at 25F without detrimentally affecting other properties such as autogenous ignition temperature, pour point, flash and fire points were established. Studies on the formulation of six selected fluid base stocks were initiated. A fluid composed of alkoxylated hydroxy diphenyl oxide as base stock, Ucon 90,000 as viscosity index improver, and water met the specifications for viscosity, pour point, autogenous ignition temperature, flash and fire points. (Author)

AD-609 974 Div. 14, 27
OTS Prices: HC $3.00/MF $0.75

Union Carbide Research Inst., Tarrytown, N. Y.
RESEARCH ON PHYSICAL AND CHEMICAL PRINCIPLES AFFECTING HIGH TEMPERATURE MATERIALS FOR ROCKET NOZZLES.
Quarterly progress rept. for 1 Oct-31 Dec 64,
by S. R. Aspinall and Verner Schomaker. 31 Dec 64, 60p
Contract DA30 069ORD2787, ARPA Order 34 63, Task 4

Unclassified report

Descriptors: (*Rocket motor nozzles, Refractory materials), (*Refractory materials, Rocket motor nozzles), Tungsten, Oxidation, Carbon dioxide, Reaction kinetics, Hydrogen compounds, Fluorides, Chemical reactions, Gases, Solids, Mass spectroscopy, Nozzle inserts, Corrosion, Molybdenum, Oxides, Mechanical properties, High-temperature research, X-ray diffraction analysis, Elasticity, Creep, Carbides, Titanium compounds, Niobium, Single crystals, Stresses, Borides, Zirconium compounds, Tantalum compounds, Hafnium compounds, Composite materials, Solid solutions, Nickel, Microstructure.

AD-609 985 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Cincinnati, Ohio.
INFLUENCE OF STRESS CORROSION ON STRENGTH OF GLASS FIBERS.
Bimonthly progress rept. no. 4,
by D. L. Hollinger, W. G. Kanetzky, and H. T. Plant.
30 Nov 64, 21p
Contract Nonr448600

Unclassified report

See also AD-607 040.

Descriptors: (*Glass textiles, Corrosion), (*Corrosion, Glass textiles), (*Stresses, Corrosion), Glass, Filaments, Fatigue (Mechanics), Cryogenics, Statics, Loading (Mechanics), Tensile properties, Low-temperature research.

Static fatigue tests at liquid nitrogen temperature have been completed on virgin E-glass single filaments. In these tests, fibers approximately 0.0005-inch diameter were dead-loaded in tension while at -196C and maintained at that temperature for at least 48 hours. Loads were varied within the high stress region from 400,000 to 650,000 psi. No static fatigue failures were observed under these conditions, even though the stress range was high enough to cause immediate failure of some fibers upon load application. This is in distinct contrast to the behavior observed at room temperature in normal humidity where delayed failures occurred over several decades of time with stress level ranging from 200,000 to 400,000 psi. (Author)

AD-610 036 Div. 14, 4, 31
OTS Prices: HC $2.00/MF $0.50

Union Carbide Plastics Co., Bound Brook, N. J.
RESEARCH ON IMPROVED EPOXY RESINS.
Quarterly progress rept. no. 7, 1 Oct 64-1 Jan 65,
by J. R. Harvey, W. P. Mulvaney, R. F. Sellers, S. G. Smith, Jr., and A. C. Soldatos. 1 Jan 65, 45p
Contract Nonr417200

Unclassified report

See also AD-607 295.

Descriptors: (*Filament wound construction, Binders), (*Epoxy plastics, Synthesis (Chemistry)), Molecular structure, Physical properties, Cyclopentanes, Ethers, Cyclopentenes, Phenols, Purification, Tensile properties, Compressive properties, Shear stresses, Catalysts, Submarine hulls, Composite material, Plastics, Performance (Engineering), Hardening, Laminated plastics, Pressure vessels.

The purpose of this program is to define the correlation of novel polyepoxide molecular configurations with the physical properties of cured resins as the initial step in providing significant improvements in filament reinforced plastics for deep submergence structures. The synthesis and evaluation of new epoxy resin configurations was continued. Increased emphasis was placed on greater realization of the potential performance of the more promising epoxy resins through such variables as formulation, handling technique, resin quality and curing schedules. Significant improvement in the interlaminar shear strength of ERRA-0300 was achieved through formulation. Preliminary data for shear strength after water boil and for flexural stress rupture properties in salt water are reported for ERLA-0400, ERRA-0300 and ERNA-0386 to indicate the type of performance to be expected under service conditions. Physical property data accumulated under the program were compared to the molecular spacing within each epoxy resin configuration. (Author)

AD-610 136 Div. 14, 17
OTS Prices: HC $1.00/MF $0.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.

A STUDY OF VARIOUS INHIBITORS FOR PREVENTION OF GALVANIC CORROSION.
Final rept.,
by W. H. Deaver. 4 Jan 65, 13p CCL-175
Proj. IC024401A110 Unclassified report

Descriptors: (*Metals, Corrosion), (*Corrosion inhibition, Electrodeposition), (*Corrosion, Electrolysis), Coatings, Magnesium, Steel, Surface properties, Sodium compounds, Organic sulfur compounds, Aromatic compounds, Metals, Salts, Environmental tests, Salt spray tests, Composite materials.

Various types of corrosion inhibitors and metallic salts were evaluated to determine their ability to prevent or retard galvanic corrosion of magnesium-steel assemblies. Screening tests showed sodium mercaptobenzothiazole (NaMBT) to be the most effective for prevention of galvanic corrosion on specimens immersed in a 3 percent salt solution. An attempt was then made to utilize NaMBT in a pretreatment for magnesium-steel couples. A procedure was developed for anodically depositing a coating from a NaMBT bath, however, the coating produced failed to provide the desired corrosion resistance. (Author)

AD-610 168 Div. 14, 30
OTS Prices: HC $2.00/MF $0.50

Koppers Co., Inc., Monroeville, Pa.
DEVELOPMENT OF HIGH TEMPERATURE SEAL-LUBRICANT DEPOSIT EVALUATION TECHNIQUES.
Rept. for 1 Feb-31 Dec 63,
by Billy D. Pfoutz, John S. Lagarias, and Ernest E. Donath. Sep 64, 47p
Contract AF33 616 7893, Proj. 3044, Task 304401
APL TDR64 78

Unclassified report

Descriptors: (*Lubricants, Test methods), Test equipment, Heating, Oil seals, Hydraulic seals, High-temperature research, Performance (Engineering), Contamination.

Equipment and procedure refinements were required to develop a more suitable evaluation test for MIL-L-9236 type lubricants as well as for higher temperature fluids. An evaluation test, using an ASD seal-lubricant rig, has been under development to determine the performance of lubricants at elevated temperatures. Repeatability and correlation with engine results were established. Procedures are given for cleaning and operating the rig, for evaluating seal deposits, and for detail deposit photography. Seal head design to improve rig operation and facilitate adaptation to the Erdco Universal Tester has been constructed and is under development. Equipment and procedures developed will enable more wide spread use of the evaluation technique. (Author)

AD-610 223 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMERS.
Quarterly progress rept. no. 7, 1 Sep-30 Nov 64,
by S. L. Axelrood and W. J. Lajiness. 30 Nov 64, 27p
Contract DA20 018ORD24883

Unclassified report

See also AD 607 284.

Descriptors: (*Isocyanate plastics, Elastomers), (*Elastomers, Synthesis chemistry), Low temperature research, Polymers, Mechanical properties, Tensile properties, Ethers, Alcohols, Amines, Organic nitrogen compounds, Oils, Moisture, Absorption, Plasticizers, Synthetic rubber.

A series of urethane-urea elastomers were prepared from an eleven thousand molecular weight triol and a forty seven hundred molecular weight diol. These had lower properties than similar elastomers prepared from higher molecular weight polyethers. Elastomers prepared with a variety of monomeric diols and triols were compared to similar elastomers prepared with trimethylolpropane. The latter elastomers had better combinations of properties. Effect of incorporating extractable plasticizer was also investigated. This tended to improve oil resistance and low temperature properties. (Author)

AD-610 248 Div. 14, 4
OTS Prices: HC $2.00/MF $0.50

Air Force Materials Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF BASIC FACTORS INVOLVED IN THE FORMULATION AND CHARACTERIZATION OF ALUMINUM COMPLEX IMIDO ACIDS AS HIGH TEMPERATURE GREASE THICKENERS,
by Ernest L. Plummer. Oct 64, 26p ML-TR-64-324
Proj. 7343, Task 734301

Unclassified report

See also AD-430 746.

Descriptors: (*Greases, Gels), (*Aluminum compounds, Benzoates), Stability, Hydrates, Gravimetric analysis, Infrared spectroscopy, Substitutes, Synthesis (Chemistry), Molecular structure, Chemical properties, Physical properties, Bibliographies, Abstracts.

The report covers recent studies of aluminum salts of substituted benzoic acids for use as high temperature grease thickeners. It has been shown that although aluminum tribenzoate can be prepared by the reaction of aluminum isopropoxide with benzoic acid, it is hydrolytically unstable and, on exposure to moisture, hydrolyzes to aluminum dibenzoate monohydroxide. A literature survey on aluminum salts is included in addition to infrared and thermal gravimetric analysis data on the aluminum salts which have been prepared. (Author)

15. Mathematics

AD-609 940 Div. 15, 25
OTS Prices: HC $2.00/MF $0.50

American Science and Engineering, Inc., Cambridge, Mass.
TABLES OF ABSCISSAE AND WEIGHTS FOR THE EVALUATION OF GAUSS-LAGUERRE QUADRATURE INTEGRALS.
Final rept., pt. 1,
by Yvain M. Treve. 1 Jul 64, 36p ASE-511
Contract AF19 628 2388, Proj. 8647, Task 864701
AFCRL 64 594 P1

Unclassified report

Descriptors: (*Integrals, Tables), (*Mathematics, Tables), Numerical analysis, Series, Polynomials, Bessel functions, Integral equations, Functions, Weight, Plasma physics, Special functions (Mathematical), Integration.

The abscissae and weights of the Gauss-Laguerre quadrature formula are given to 18 places.

AD-609 960 Div. 15, 16
OTS Prices: HC $1.00/MF $0.50

Michigan State Univ., East Lansing.
ON A PARTIAL DIFFERENTIAL EQUATION OF EPIDEMIC THEORY. II. THE MODEL WITH IMMIGRATION,
by J. Gani. 5 Jan 65, 14p RM-124-JG-4
Contract Nonr258705

Unclassified report

See also AD-609 409.

Descriptors: (*Stochastic processes, Partial differential equations), (*Partial differential equations, Stochastic processes), (*Epidemiology, Stochastic processes), Integral transforms, Transformations (Mathematics), Integration, Medical research.

A generalization of the basic model which arises in the stochastic theory of epidemics is that for which at time $t>0$, there are in circulation r uninfected susceptibles and s infectives, $m + n + s - r - s$ removals of infectives having occurred since time $t = 0$. Here the integer m represents the number of susceptible immigrants who have entered the population since time $t = 0$, when the initial population consisted of n susceptibles and a infectives only. It will be found useful to keep track of the number of immigrants m in the population as well.

AD-610 034 Div. 15, 25
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
NONPARAMETRIC LIFE TEST SAMPLING PLANS.
Technical rept. no. 77,
by Richard E. Barlow and Shanti S. Gupta.
8 Jan 65, 76p
Contract Nonr22553, Proj. NR042 002

Unclassified report

Prepared in cooperation with California Univ., Berkeley, Contract Nonr365618 and Purdue Univ., Lafayette, Ind., Contract AF33 657 11737.

Descriptors: (*Sampling, Theory), (*Quality control, Decision theory), (*Statistical analysis, Reliability), Probability, Inequalities, Statistical distributions, Life expectancy, Failure (Mechanics), Stochastic processes.

Sampling plans for truncated life tests based on exponential, normal, lognormal, gamma, etc., have all been treated in the literature. These assume that prior information on the form of the distribution is available. This report presents non-parametric life test sampling plans based on percentiles under assumptions concerning only the failure rate, either increasing or decreasing, as well as plans based on the mean life. Tables are given to determine required sample sizes for a given protection. (Author)

AD-610 061 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NEW DERIVATION OF THE INTEGRO-DIFFERENTIAL EQUATIONS FOR CHANDRASEKHAR'S X AND Y FUNCTIONS,
by R. Bellman, H. Kagiwada, R. Kalaba, and S. Ueno. Dec 64, 11p RM-4349-ARPA
Contract SD79, ARPA Order189 61

Unclassified report

Descriptors: (*Functions, Integral equations), (*Integral equations, Differential equations), (*Light, Scattering), (*Equations, Scattering), Wave transmission, Functions, Electromagnetic waves, Propagation, Invariance, Diffusion, Photons, Functional analysis, Atmosphere, Optical properties, Electromagnetic wave reflections, Probability, Albedo, Operators (Mathematics), Transport properties.

The X and Y functions of Chandrasekhar are of great importance in the theory of multiple scattering in a finite slab. Their properties are best determined analytically through the use of integral equations. From the computational view, though, they are best treated as solutions of a system of integro-differential equations. A derivation is produced from first principles which illuminates the nature of the integro-differential equations and which will aid in computational studies of transport processes. A knowledge of integral equations and Chandrasekhar's book, Radiative Transfer, is assumed. (Author)

AD-610 072 Div. 15, 9
OTS Prices: HC $3.00/MF $0.75

Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
DISTRIBUTION OF THE STUDENTIZED SMALLEST CHI-SQUARE, WITH TABLES AND APPLICATIONS,
by P. R. Krishnaiah and J. V. Armitage. Dec 64,
94p ARL 64-218
Proj. 7071, Task 7071 01

Unclassified report

Descriptors: (*Statistical distributions, Statistical tests), (*Integrals, Statistical distributions), (*Tables, Statistical distributions), Analysis of variance, Probability, Population (Mathematics).

The distribution of the studentized smallest chi-square plays an important role in the problems of testing for the homogeneity of variances and in the ranking and selection procedures. In this paper, the evaluation of the probability integrals associated with this distribution is considered. Using Gauss-Laguerre quadrature formula, lower 10%, 5%, 2.5% and 1% points are tabulated. Various applications of these tables are also discussed.

AD-610 084 Div. 15
OTS Prices: HC $1.00/MF $0.50

Princeton Univ., N. J.

ON SOME CRITICISMS OF GAME THEORY.
Econometric Research Program research paper,
by Oskar Morgenstern. Sep 64, 18p ERP-RP-8
Contract Nonr185816

Unclassified report

Descriptors: (*Game theory, Analysis), Mathematical models, Operations research, Warfare.

Game theory is a mathematical model of certain situations of human conflict and cooperation. As in all models there are severe simplifications; if these are found to be undesirable they have to be replaced by others or additional elements have to be introduced, thereby complicating the model, possibly beyond the degree of complication which we are able to manage at present. The demand to consider such other elements is typical of certain critics such as Zuckerman, Blackett etc. but they have not developed any methods with which to study additional complications. Instead, recourse is had to exhortations, to appeal to 'intuition', 'experience', 'judgement' etc. which remain unanalyzed and therefore have little operational meaning. If a rigorous theory is rejected as inadequate for analyzing a problem a less rigorous procedure can lead to better or equivalent results only by accident. There are many genuine, open problems in game theory, especially there exists the need to give an existence proof of solutions for arbitrary large n-person games. The author outlines many other unsolved problems but expresses confidence that they too will find answers as have those which characterize the development of the theory since 1944. (Author)

AD-610 088 Div. 15
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
A MOMENT PROBLEM,
by Lajos Takacs. 11 Nov 64, 10p
CU-48-64-Nonr-266(59)MS
Contract Nonr26659, Proj. NR042 205

Unclassified report

Descriptors: (*Probability, Theory), (*Sequences, Binomials), Function, Transformations (Mathematics), Series, Distribution theory.

AD-610 089 Div. 15
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
A COMBINATORIAL THEOREM FOR STOCHASTIC PROCESSES,
by Lajos Takacs. 15 Jan 65, 5p
CU-50-65-Nonr-266(59)MS
Contract Nonr26659, Proj. NR042 205

Unclassified report

Descriptors: (*Stochastic processes, Theorems), (*Combinatorial analysis, Stochastic processes), Statistical processes, Probability, Statistical distributions, Statistical functions.

AD-610 090 Div. 15
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
THE DISTRIBUTIONS OF SOME STATISTICS DEPENDING ON THE DEVIATIONS BETWEEN EMPIRICAL AND THEORETICAL DISTRIBUTION FUNCTIONS,
by Lajos Takacs. 21 Dec 64, 15p
CU-49-64-Nonr266(59)
Contract Nonr26659, Proj. NR042 205

Unclassified report

Descriptors: (*Statistical distributions, Statistical functions), (*Statistical functions, Statistical distributions), Stochastic processes, Combinatorial analysis, Theorems, Probability.

The aim of this paper was to show that some theorems which have been obtained by generalizing the classical ballot theorem have many useful applications in the theory of order statistics. Distributions of some random variables were determined by using a simple combinatorial theorem.

AD-610 099 Div. 15
OTS Prices: HC $3.00/MF $0.75

Coordinated Science Lab., Univ of Illinois, Urbana.
LIMIT CYCLES IN A CERTAIN CLASS OF SAMPLIED-DATA CONTROL SYSTEMS,
by Ronald A. Werner. Dec 64, 97p CSL-R-238
Contracts DA28 043AMC00073E, AF49 638 1383

Unclassified report

Descriptors: (*Control systems, Mathematical analysis), (*Linear systems, Mathematical analysis), (*Nonlinear systems, Mathematical analysis), Sampling, Differential equations, Feedback, Stability, Trajectories.

This paper discusses periodic, unforced solutions (called limit cycle solutions) to the state and output equations of a certain class of nonlinear sampled-data control systems. The class of systems consists of a linear plant, a single nonlinearity, a sample and hold element and a single feedback loop. Two different methods are given for determining the possible existence and the solutions for the limit cycles. An approximate method for determining possible existence and output solutions for limit cycles is also given. Finally, a certain kind of stability of limit cycle solutions is defined, and sufficient conditions for the stability and instability of limit cycles are developed. (A limit cycle is defined as a periodic trajectory in state space; i.e., it is an unforced, periodic, steady state solution to the state space equations of the system.)

AD-610 105 Div. 15
OTS Prices: HC $2.00/MF $0.50

Andrews Univ., Berrien Springs, Mich. Dept. of Mathematics.
OPERATORS IN ENERGY SPACE.
Technical rept.,
by E. J. Specht and H. T. Jones. Dec 64, 42p
Contract Nonr391100, Proj. NR041 288

Unclassified report

Descriptors: (*Operators (Mathematics), Functional analysis), (*Functional analysis, Operators (Mathematics)), Integral equations, Potential theory, Boundary value problems, Conformal mapping, Complex numbers, Inequalities, Measure theory, Sequences, Topology, Harmonic analysis.

Contents: Compactness of the Neumann-Poincare operator; Some preliminary results concerning the norm in H and properties of the operator L.

AD-610 156 Div. 15
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
ESTIMATION IN FINITE POPULATIONS,
by Geoffrey S. Watson. 1963, 12p
Contract Nonr401009

Unclassified report

Descriptors: (*Population (Mathematics), Sampling), (*Sampling, Population (Mathematics)), (*Monte Carlo method, Sampling), Statistical analysis, Set theory, Permutations, Vector analysis.

AD-610 157 Div. 15
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
ON THE BEHAVIOUR OF THE CHARACTERISTIC FUNCTION OF A PROBABILITY DISTRIBUTION IN THE NEIGHBOURHOOD OF THE ORIGIN, PART I,
by E. J. G. Pitman. Jun 64, 20p
Contract Nonr401009

Unclassified report

Descriptors: (*Statistical distributions, Probability), (*Statistical functions, Statistical distributions), Measure theory, Functions, Stochastic processes, Real variables, Theorems, Integrals.

AD-610 158 Div. 15
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
LOCALLY MOST POWERFUL RANK TESTS FOR THE TWO-SAMPLE PROBLEM WITH CENSORED DATA,
by Joseph L. Gastwirth. Dec 64, 9p
Contract Nonr401009

Unclassified report

Descriptors: (*Statistical tests, Theory), (*Statistical data, Statistical tests), Sampling, Monte Carlo methods, Population (Mathematics), Statistical functions, Inequalities.

AD-610 159 Div. 15, 16
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
LINEAR RELATIONSHIPS BETWEEN VARIABLES AFFECTED BY ERRORS,
by F. D. Carlson, E. Sobel, and G. S. Watson. 1964, 21p
Contract Nonr401009; Grant NIH RG3723

Unclassified report

Descriptors: (*Statistical analysis, Medical research), (*Medical research, Mathematical analysis), Factor analysis, Correlation techniques, Errors, Analysis of variance, Linear systems, Least squares method, Muscles, Hydrolysis, Heat production (Biology), Amino acids, Phosphates, Biology, Experimental data.

Although of frequent occurrence in science the problem of estimating linear relationships when all variates are subject to error, is rarely discussed in statistical courses or texts because most statisticians regard it as insoluble. This attitude arises from considering only a mathematical formulation which gives rise to an insoluble problem. It is here claimed that, in biometrical practice, additional information can be found so that routine methods can be used for the soluble problem. This is brought to the attention of biometricians and the importance of collecting the required additional data is stressed. The solution of the problem lies then in the proper design of the experiment.

AD-610 169 Div. 15, 18, 32
OTS Prices: HC $1.00/MF $0.50

George Washington Univ., Washington, D. C.
A DEMAND DISTRIBUTION MODEL,
Scientific rept.,
by Fred D. Rigby. 14 Dec 64, 24p T-175
Contracts Nonr76103, Nonr76105, Projs. NR345 107, NR047 001

Unclassified report

Rept. on Logistics Research Proj.

Descriptors: (*Logistics, Replacement theory), (*Replacement theory, Logistics), (*Stochastic processes, Replacement theory), Distribution, Maintenance, Distribution theory, Mathematical models, Mathematical prediction, Inventory.

A particular repair policy is employed as rationale for the derivation of a time dependent stochastic process which yields a family of demand distributions appropriate to situations in which demand events have multiple outcomes. Elementary properties of these distributions are derived. Under plausible specialization of assumptions the family is found to include the Poisson distribution and a known natural generalization thereof. (Author)

AD-610 170 Div. 15, 18, 32
OTS Prices: HC $1.00/MF $0.50

George Washington Univ., Washington, D. C.
SUMMATION BY PARTS, ABEL'S IDENTITY, AND MATHEMATICAL EXPECTATION,
by W. H. Marlow. 13 Jan 65, 18p T-179
Contracts Nonr76103, Nonr76105, Projs. NR345 107, NR047 001

Unclassified report

Rept. on Logistics Research Proj.

Descriptors: (*Mathematical prediction, Logistics), (*Logistics, Mathematical prediction), (*Difference equations, Distribution theory), Identities, Series, Probability, Transformations (Mathematics), Inventory.

This report starts with a brief introduction to the summation calculus through consideration of sums and differences as inverses. Following this, several relations are derived for use in transforming sums, including sums of infinitely many terms. Special attention is paid to problems of convergence for expectations relative to discrete probability distributions. (Author)

AD-610 310 Div. 15
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE NORMAL DISTRIBUTION AND ITS LIMITS OF APPLICABILITY,
by Erich Pieruschka. 15 Sep 60 38p LMSC-480934
Contract NOrd17017

Unclassified report

Descriptors: (*Statistical distributions, Measure theory), Curve fitting, Population (Mathematics), Distribution theory, Probability, Transformations (Mathematics), Statistical functions, Statistical tests, Life expectancy, Redundant components.

This study is a probe into the application of normal distribution and describes the limits of mathematical description of the distribution of a technical characteristic through normal distribution, including the fitting of a population distribution through normal distribution by transformation of a statistically distributed characteristic. Finally, there is a discussion of the necessary numbers of units to be tested in order to measure a low probability. (Author)

AD-610 315 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
ON MARKOV CHAINS WITH THE STRONG RATIO LIMIT PROPERTY,
by J. H. Folkman and S. C. Port. Jan 65, 17p
RM-4355-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Probability, Measure theory), Sequences, Set theory, Stochastic processes, Motion.

In this memorandum the authors contribute to the theory of Markov chains as follows: The probability that a particle moving according to a recurrent random walk is in a given finite set at some time long after the starting time is proportional to the number of points in that set. This property is not true for all random motions, and it is a matter of some interest in probability theory to know for what systems an analogous result is true. Some conditions are established under which there is an analogous result.

AD-610 322 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT A METHOD OF SOLVING SYSTEMS OF NONLINEAR FINITE-DIFFERENTIAL EQUATIONS OF PLATE BENDING,
by M. S. Kornishin and D. A. Kasimova. 8 Jan 65, 11p FTD-TT-64-422
TT 65 61038

Unclassified report

Unedited rough draft trans. of mono. Konferentsii po Teorii Plastin i Obolochek, Kazan, 1960. Trudy, 1961, p. 191-198.

Descriptors: (*Nonlinear differential equations, Iterative methods), (*Iterative methods, Nonlinear differential equations), (*Metal plates, Deflection), Loading (Mechanics), Deformation, Elasticity, Stresses, Numerical analysis, Combinatorial analysis, USSR.

The method is based on the use of a general iteration method in combination with an extrapolation method for the obtainment of zero approximation roots. With this method were solved systems of nonlinear differential equations, to which are brought problems of greater bends and a square plate with hinge fastened and rigidly fitted edges exposed to the effect of a uniformly distributed load, applied to a small area in the vicinity of the center. Calculations were made on the STRELA computer.

AD-610 351 Div. 15
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ABOUT A METHOD OF NUMERICAL SOLUTION OF NONLINEAR SYSTEMS,
by A. Krylov. 13 Jan 65, 6p FTD-TT-64-612
TT 65 61024

Unclassified report

Unedited rough draft trans. of mono. Voprosy Vychislitel'noi Matematiki i Vychislitel'noi Tekhniki, n.p., 1963, p. 82-84.

Descriptors: (*Numerical methods and procedures, Nonlinear differential equations), (*Nonlinear differential equations, Numerical methods and procedures), Functions, Iterative methods, Numerical analysis, USSR.

16. Medical Sciences

AD-609 908 Div. 16, 4
OTS Prices: HC $3.00/MF $0.75

Aerospace Medical Div., Air Force Systems Command, Brooks AFB, Tex.
INDEX OF TRADE, CHEMICAL AND COMMON NAMES OF FOREIGN DRUGS AND OTHER PHARMACOLOGIC AGENTS.
15 Jan 65, 90p
AFSC-AMD TH65 1; TT 65 60698

Unclassified report

Partial trans. of mono. Medexport Manual of the USSR, Moscow, 1964.

Descriptors: (*Drugs, Handbooks), Pharmacology, Indexes, USSR.

The purpose of the handbook is to present an index of trade, chemical and common names of drugs, chemotherapeutic compounds and other pharmacologic agents which have been found in the scientific and technical literature of foreign countries, including other English-speaking countries. The requirement for this handbook evolved out of numerous requests from scientific and technical personnel within the Aerospace Medical Divison, for the corresponding American trade, chemical or common name of various pharmacologic agents which have been referenced in the foreign literature. (Author)

AD-609 927 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval Dental School, Bethesda, Md.
ABSTRACT OF RESEARCH REPORTS OF PROJECTS COMPLETED IN PARTIAL FULFILLMENT OF REQUIREMENTS OF THE GENERAL POSTGRADUATE COURSE AND THE RESIDENCY PROGRAMS.
Jun 64, 17p

Unclassified report

Descriptors: (*Dentistry, Medical research), Teeth, Prosthetics, Diseases, Germicides, Drugs, Zinc compounds, Silver, Plating, Alginic acid, Silicone, Bone, Calcification, Cytology, Mouth, Histology, Mercury alloys, Dental personnel, Education, Abstracting.

Abstracts of reports on dental research, surgery, and techniques are presented.

AD-609 937 Div. 16, 29
OTS Prices: HC $1.00/MF $0.50

Aerospace Crew Equipment Lab., Naval Air Engineering Center, Philadelphia, Pa.
METABOLIC MECHANISMS OF MAN IN THE FULL PRESSURE SUIT. PHYSIOLOGICAL COST OF DONNING A FULL PRESSURE SUIT,
by Edwin Hendler, Donald W. Dery, and Neil Miller.
1 Dec 64, 25p
Proj. 32, Task R360FR101 200 1R011 0101
NAEC ACEL 527

Unclassified report

Descriptors: (*Metabolism, Space medicine), (*Pressure suits, Stress (Physiology)), Oxygen consumption, Pulse rate, Energy, Physiology, Time studies, Effectiveness, Protective clothing, Volume, Exercise, Naval personnel.

Experienced subjects donned the U. S. Navy MK-4 Full Pressure Suit under conditions of time and donning space limitations. Direct and indirect measures of physiological cost were made using oxygen consumption and heart rate, respectively. Approximately 1 kcal of energy per kg of body weight was expended in the donning task. Donning volumes as small as about 7 times the volume of the subject's body accommodated the dressing procedure with no apparent increases in donning time nor in energy expenditure. Suit fit was found to have an important effect on both effort and time required for donning. (Author)

AD-609 954 Div. 16
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
ENZYMATIC STUDIES ON THERMOPHILIC BACTERIA.
Final rept. for 1 Feb 62-31 Dec 64,
by L. Leon Campbell. 31 Dec 64, 11p
Contract Nonr183440, Proj. NR108 330

Unclassified report

Descriptors: (*Bacterial extracts, Enzymes), (*Biosynthesis, Glycoside hydrolases), (*Glycoside hydrolases, Biosynthesis), Thermal properties, Amino acids, Carbohydrates, Metabolism, Peptides, Growth, Spores, Purification, Bacteriophages, Biochemistry, Microbiology.

The objectives of the research were (1) to prepare crystalline alpha-amylase from thermophilic bacteria and to study the physical and chemical properties of the preparations in order to obtain data relative to the problem of thermal stability; (2) to study the biosynthesis of alpha-amylase by Bacillus stearothermophilus; (3) to study conditions of induction of a lysogenic system in B. stearothermophilus; (4) to isolate and purify enzymes from thermophilic bacteria related to amino acid and carbohydrate metabolism; and (5) to study the physical and chemical properties of the above enzymes. Studies were initiated on the sequence of the alpha-amylase of B. stearothermophilus by using chains A and B which are formed by performic acid oxidation. Conditions for the isolation of peptides were examined and efforts were made to obtain sufficient material to study the sequence of the two chains.

AD-609 963 Div. 16
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
SYNAPTIC TRANSMISSION IN SYMPATHETIC GANGLIA.
Rept. no. 2 (final), 1 Jun 63-30 Jun 64,
by Benjamin Libet. 15 Jan 65, 20p
Contract DA18 108AMC161A

Unclassified report

See also AD-602 702.

Descriptors: (*Neuromuscular transmission, Nerve cells), (*Ganglia, Autonomic nervous system), (*Atropine, Neuromuscular transmission), Drugs, Curare alkaloids, Sympatholytic agents, Sympathomimetic agents, Parasympatholytic agents, Epinephrine, Tissues (Biology), Penetration, Inhibition, Mammals, Frogs, Brain, Test equipment.

Properties of the atropine-sensitive slow synaptic responses in mammalian sympathetic ganglia were further analysed as to their 1) postsynaptic origin, 2) transmitter substances, and 3) durations of synaptic delays for each. Intracellular studies on single ganglion

cells of frog's sympathetic ganglia are also reported in relation to 1) atropine-sensitivity of true after-potentials and 2) pre- and postsynaptic blocking action of curariform substances. The actions of other nicotinic blocking agents (hexamethonium, mecamylamine) on frog ganglionic synaptic responses are also reported. Developments in the technique for intracellular recording in mammalian ganglia are described. (Author)

AD-610 063 Div. 16
OTS Prices: HC $1.00/MF $0.50

Vanderbilt Univ., Nashville, Tenn. School of Medicine.
A PROGRAM OF RESEARCH ON PROBLEMS OF MALNUTRITION IN THE MIDDLE EAST AND AFRICA (NAMRU-3 REGION).
Final rept.,
by William J. Darby and William N. Pearson. 1963, 13p
Contract Nonr214900

Unclassified report

Program continued under Grant NIH AM08317 01.

Descriptors: (*Deficiency diseases, Middle East), (*Africa, Deficiency diseases), Anemias, Parasitic diseases, Worms, Anthelmintics, Radioactivity, Food, Zinc, Absorption (Biological), Hemoglobin, Hematology, Pathology, Children, Endocrine glands, Biochemistry.

Interest was directed toward the problem of anemia. Studies included: (a) Investigation of the interrelationship of hookworm disease and iron deficiency anemia. This study showed a relationship between the severity of anemia and magnitude of the hookworm infestation as quantitated by the number of parasites expelled after administration of an effective vermifuge, (b) Investigation of the absorption of radioactive iron by anemic and non-anemic subjects, of iron incorporated as an enrichment mixture in maize, and the availability of iron naturally occurring in food products (chicken, eggs, maize, beans, wheat). These investigations as initially planned have been extended to study in greater detail the physiology of the metal in the plant when applied by injection into the growing stem as well as leaf application. Similar studies with zinc are now in progress.

AD-610 091 Div. 16, 3
OTS Prices: HC $4.00/MF $1.00

Army Engineer Research and Development Labs., Fort Belvoir, Va.
DECONTAMINATION OF WATER CONTAINING BACILLUS SUBTILIS VAR. NIGER SPORES BY U. S. ARMY FIELD WATER PURIFICATION PROCESSES AND EQUIPMENT.
Research rept. for Dec 63-Mar 64,
by Maurice Pressman and Robert G. Grodt. 16 Nov 64, 117p AERDL 1799-RR
Task 1D624101D55107

Unclassified report

Research done in cooperation with Army Environmental Hygiene Agency, Edgewood Arsenal, Md.

Descriptors: (*Decontamination, Water supplies), (*Water pollution, Bacillus subtilis), Biological contamination, Spores, Biological warfare agents, Simulation, Germicides, Army equipment, Water filters, Coagulation, Ion exchange, Iron compounds, Chlorides, Limestone, Calcium compounds, Hypochlorites.

A series of full-scale water decontamination studies was conducted. The purpose of these studies was to evaluate with field Army equipment the effectiveness of various water treating processes such as hypochlorination, coagulation, filtration, distillation, and ion exchange resin treatment in the decontamination of water containing the non-pathogenic, heat-resistant and chlorine-resistant spores of Bacillus subtilis var. niger, used to simulate a refractory biological warfare agent. A 99.999-percent removal or destruction of the test organism was designated as the criterion of effective decontamination. Results indicate that the process combining coagulation with ferric chloride and limestone, hypochlorination with calcium hypochlorite to a free chlorine residual of at least 5 mg/1, and filtration through a diatomite filter is effective in accomplishing a 99.999-percent removal or destruction of spores from water contaminated to a level of 1,000,000 isms per ml. Vapor compression distillation of fresh or saline water is also effective. (Author)

AD-610 103 Div. 16
OTS Prices: HC $3.00/MF $0.75

Northeastern Univ., Boston, Mass.
STUDIES IN PATHOLOGICAL SPEECH PRODUCTION.
Final rept.,
by William R. Smith and Philip Lieberman.
Jun 64, 77p
Contract AF19 628 1678, Proj. 5628, Task 562802
AFCRL 64 379

Unclassified report

Descriptors: (*Throat, Pathology), (*Pathology, Throat), (*Speech, Pathology), Diagnosis, Medical examination, Sound pitch, Histological techniques, Recording systems, Oscilloscopes, Neoplasms, Cancer, Tissues (Biology), Programming (Computers), Psychoacoustics.

This research was directed toward the correlation of minute variations in the pitch periodicity of human speech (pitch perturbations) with several types of physical lesion of the larynx. A sample of 144 laryngeal patients and 35 normal controls, all of whom spoke English, were recorded in acoustically treated rooms on high fidelity apparatus in order to collect large samples of pitch periods from which pitch perturbations were measured. An involved medical diagnosis, including post-operative biopsies when required was achieved for each patient in order to determine the type, size, and location of his laryngeal defect. Significant relationships were found between selected pitch perturbation factors (PF) and the following pathological conditions: (1) cancer (CA) of the vocal cords; (2) polyps on or near the vocal cords; and (3) acute and chronic laryngitis. The results of this study support the hypothesis that certain types of laryngeal lesion can be identified by spectral analysis of recorded speech samples.

AD-610 132 Div. 16, 28
OTS Prices: HC $2.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
PHYSIO-MECHANICAL EFFECTS OF ACCELERATIONS ON HUMAN BEINGS WORKING IN A ROTATING ENVIRONMENT.
Technical note,
by Harry C. Crews, Jr. Aug 63, rev. Nov 64, 38p
BrownEng-R-63

Unclassified report

Descriptors: (*Acceleration tolerance, Adaptation (Physiology)), (*Rotation, Adaptation (Physiology)), Stress (Physiology), Reaction (Psychology), Confined environments, Performance (Human), Thresholds (Physiology), Vestibular apparatus, Semicircular canals, Pathology, Mathematical analysis, Maintenance personnel, Radar equipment.

The mechanical forces acting upon personnel and equipment in a rotating environment are described. These forces are used to explain the observed physiological and psychological reactions of personnel. Procedures and practices are recommended to hold adverse reactions to an acceptable minimum. (Author)

AD-610 155 Div. 16
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOLUME IV, NUMBER 1,
ed. by George Anastos. 1965, 17p
Contract DA49 193MD2238

Unclassified report

Descriptors: (*Insects, Bibliographies), (*Bibliographies, Insects), Ticks, Mites, Diptera, Siphonaptera, Lice, Spirochaeta, Blattidae, Bacteria, Protozoa, Rickettsia, Parasites, Hemiptera, Virus diseases, Disease vectors, Pest control, USSR, Europe, China.

AD-610 161 Div. 16, 4, 32
OTS Prices: HC $1.00/MF $0.50

Imperial Coll. of Science and Tech., London (England).
PHOTOSYNTHETIC MECHANISMS UNDER SUB-OPTIMAL CONDITIONS.
Final scientific rept.,
by C. P. Whittingham. 21 Oct 64, 18p
Grant AF EOAR64 1
AFOSR 65 0056

Unclassified report

Descriptors: (*Photosynthesis, Tracer studies), (*Algae, Photosynthesis), Sucrose, Degradation, Glycols, Culture media, Labeled substances, Glucose, Metabolism, Life support, Great Britain.

Sucrose produced by photosynthesis in Chlorella was degraded under conditions when glycollate production is significant. Radioactivity was supplied from glucose. No correlation was observed between labelling pattern in sucrose and glycoliate production. (Author)

AD-610 163 Div. 16
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus.
MOSQUITO SALIVATION AND DIAPAUSE STUDIES.
Quarterly rept. no. 9, 1 Aug-31 Oct 64,
by D. M. Delong and Carl Venard. 9 Dec 64, 3p
Contract DA18 064AMC36A, Proj. 1510

Unclassified report

Descriptors: (*Culicidae, Eggs), (*Larvae, Culicidae), Temperature, Storage.

Research was completed on induction and termination of diapause in eggs and on the effects of temperature on stored diapausing and non-diapausing eggs. Experiments were also performed on induction of diapause in fourth instar larvae and on the effects of temperature on stored diapausing fourth instar larvae.

AD-610 166 Div. 16
OTS Prices: HC $2.00/MF $0.50

Navy Experimental Diving Unit, U. S. Naval Station, Washington, D. C.
HeO2 DECOMPRESSION TABLES,
by G. C. Molumphy. 26 Sep 50, 28p NEDU-8-50
Proj. NS186 201, Task 4

Unclassified report

Descriptors: (*Decompression, Tables), (*Diving, Decompression), Helium, Oxygen, Pressure, Decompression sickness.

AD-610 180 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Indiana Univ., Bloomington.
EFFECTS OF VARIATION IN VISUAL AND AUDITORY STIMULATION ON GASTROINTESTINAL MOTILITY.
Technical rept. no. 12,
by Robert M. Stern. Jan 64, 10p
Contract DA49 193MD2063

Unclassified report

Descriptors: (*Gastrointestinal system, Psychophysiology), (*Psychophysiology, Gastrointestinal system), Stimulation, Visual signals, Auditory signals, Motion, Electronic recording systems, Sensory deprivation, Test methods.

The purpose of this experiment was to investigate the effects of three different stimulus conditions on gastrointestinal motility as measured by electrodes on the surface of the abdomen. The 16 Ss were each run for two 40 min. sessions, during which they were instructed to lie quietly on a cot. Amplitude differentiated between a group that received diffuse stimulation and groups that received normal stimulation and no stimulation, with the former showing greater activity throughout the session. The increase in gastrointestinal activity for Ss in the diffuse stimulus group is attributed to the novelty and ambiguity of the stimulus situation. (Author)

AD-610 181 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Indiana Univ., Bloomington.
EFFECTS OF CONTRAST IN STIMULATION ON GASTROINTESTINAL MOTILITY.
Technical rept. no 14,
by Robert M. Stern. Jul 64, 10p
Contract DA49 193MD2063

Unclassified report

Descriptors: (*Gastrointestinal system, Stimulation), (*Stimulation, Gastrointestinal system), (*Psychophysiology, Gastrointestinal system), Visual signals, Auditory signals, Muscles, Motion, Intensity.

In a recent report (AD-610 180) evidence was presented indicating that variations in visual and auditory stimulation have a significant effect on gastrointestinal motility, as measured with surface electrodes. In the present study, the interest was in determining the effects of contrast in stimulation, or in other words, the effects of the immediately preceding level of stimulation on the g.i. response to a moderate level of stimulation. It was hypothesized that a change to a moderate level of stimulation would result in a decrease in g.i. motility below base-line level for a group that was responding at a high level to high stimulation, and an increase in level of responding for a group that was responding at a previously low level to low stimulation. Previous research has demonstrated that other somatic variables, i.e., autonomic responses and skeletal muscle responses, have shown this 'contrast' effect. The intent of the present study was to determine whether or not the g.i. system

shows this same effect, which appears to be analogous to the 'overshoot' phenomenon displayed by most negative feedback systems. (Author)

AD-610 182 Div. 16, 28
OTS Prices: HC $1.00/MF $0.50

Indiana Univ., Bloomington.
A RE-EXAMINATION OF THE EFFECTS OF RESPONSE-CONTINGENT AVERSIVE STIMULATION ON GASTROINTESTINAL ACTIVITY.
Technical rept. no. 15,
by Robert M. Stern. Jan 65, 19p
Contract DA49 193MD2063 Unclassified report

Descriptors: (*Gastrointestinal system, Stimulation), (*Stimulation, Gastrointestinal system), (*Psychophysiology, Gastrointestinal system), Visual signals, Auditory signals, Noise, Conditioned reflex, Reaction (Psychology), Adaptation (Physiology), Motion.

The purpose of this study was to compare the effects of response-contingent and random aversive auditory stimulation on g.i. motility. Ss were presented with four consecutive 10-min. treatment periods in the following order: Response-Contingent (R-C), Random, R-C, Random. During R-C S could avoid the 5-sec. 90db noise, which was programmed to come on every 30 sec., by pressing a key once during the 5 sec. preceding the noise. During the Random period, S had no control over the presentation of noise. The results indicated that during R-C, amplitude of g.i. motility was significantly greater and latency briefer than under Random conditions. These results are accounted for in terms of the dual role of the noise in the R-C condition, i.e., it is aversive and it signifies to S that his time estimation was incorrect.

AD-610 222 Div. 16
OTS Prices: HC $1.00/MF $0.50

School of Aerospace Medicine, Brooks AFB, Tex.
ENGINEERING CONSIDERATIONS IN GSR RESEARCH.
Aeromedical Reviews,
by William H. Rickles, Jr. Nov 64, 22p SAM-AR-4-64
Unclassified report

Descriptors: (*Galvanic skin response, Miniature electronic equipment), (*Space medicine, Galvanic skin response), Psychophysiology, Recording systems, Nerve impulses, Autonomic nervous system, Electrodes, Stress (Physiology), Stress (Psychology).

Standard laboratory instruments used for detecting and recording such parameters as the electroencephalogram, electrocardiogram, galvanic skin resistance, and other phenomena, cannot meet the stringent space and power limitations levied on instrumentation in space vehicles. As a result, new miniaturized devices must be developed, often by companies previously inexperienced in the technics and requirements peculiar to bioelectronic devices. The galvanic skin resistance, a parameter of psychophysiologic interest in stressful environments, would seem to have relatively simple instrumentation requirements; however, the design engineer must be familiar with the technical and practical details peculiar to the detection and recording of this phenomenon or the result may be an instrument which is technically able to measure resistance but totally unsatisfactory for measuring skin resistance under the conditions of the experiment. This paper is a synopsis of the experiences at the USAF School of Aerospace Medicine and those reported in the recent literature concerning the critical methodological points involved in studying galvanic skin reflexes to assist the engineer and the natural scientist concerned with fabricating GSR recording apparatus.

AD-610 228 Div. 16
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SOME DYNAMIC RESPONSE CHARACTERISTICS OF WEIGHT-LESS MAN.
Master's thesis,
by Charles Edward Whitsett, Jr. Aug 62,
88p GAE/Mech-62-7
Unclassified report

Descriptors: (*Body, Moments), (*Weightlessness, Dynamics), Mathematical models, Moment of inertia, Numerical methods and procedures, Anthropometry, Human engineering, Space environmental conditions.

A mathematical model is developed to approximate the mass distribution, center of mass, moments of inertia, and degrees of freedom of a human being by segmenting the body into 14 idealized masses. An analysis of the model reveals that the moments of inertia about the segment mass centers of the hands, feet, and forearms are negligible, when compared to the total body moments of inertia. However, the moment of inertia of the torso about its mass center is 10% to 35% of the total body moment of inertia. By neglecting the local moments of inertia of the smaller segments, a simplified method is achieved for calculating the moments of inertia and center of mass when the body posture changes. An investigation of some selected problems in thrust misalignment, maneuvering, free-body dynamics, stability of rotation, and torque application reveals their applicability in predicting analytically man's dynamic response characteristics in space. Preliminary experiments indicate that the torque which weightless man can exert by applying a sudden twist to a fixed handle varies as a half sine wave, and is approximately 67% of his maximum torque under normal gravity conditions. (Author)

AD-610 233 Div. 16
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
FORCE ANALYSIS OF WALKING AT REDUCED GRAVITY.
Master's thesis,
by Dennis Edward Beebe. Aug 64, 110p GA/Mech-64-1
Unclassified report

Descriptors: (*Weightlessness, Performance (Human)), (*Biophysics, Force (Mechanics)), Gravity, Space environmental conditions, Physiology, Body weight, Motion, Analysis, Space medicine, Surfaces, Tables, Reduction, Pressure suits, Simulation, Velocity, Astronauts.

In order to determine the primary surface reaction forces exerted by a man walking under reduced gravity, the vertical and longitudinal surface reaction forces were measured for a number of walking subjects, both on the ground and at reduced gravity levels between 0.1 and 1.0g. Experiments included the study of normal walking, tempo variation, and pressure suit effects. Both reaction forces varied almost directly with gravity. The lower walking limit observed for the unsuited subjects was .12g, where the limiting factor appeared to be the reduced magnitudes of the forces themselves rather than a change in their ratio. (Author)

AD-610 239 Div. 16
OTS Prices: HC $5.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TORQUE FREE ROTATIONAL DYNAMICS OF A VARIABLE-CONFIGURATION BODY (APPLICATION TO WEIGHTLESS MAN).

Master's thesis,
by James M. McCrank and Daniel R. Seger. May 64,
170p GAW/Mech-64-19

Unclassified report

Descriptors: (*Weightlessness, Theory), (*Mathematical models, Body), (*Body, Dynamics), Space biology, Bodies of revolution, Simulation, Momentum, Center of mass, Motion, Acceleration, Equations, Euler's angle, Nonlinear differential equations, Simultaneous equations, Programming (Computers), Numerical analysis, Extremities, Space environmental conditions, Configuration, Vector analysis, Differential geometry.

The foreseen problems of a free-floating space worker require a theoretical method of analyzing the rotational effects of body configuration changes. To complete such a study, a mathematical model of the human body was utilized to approximate the dynamic properties of the body. Assuming the body to be isolated (no external torques or forces), the principle of conservation of angular momentum (about the system center-of-mass) was applied to develop three simultaneous, first order, non-linear differential equations with variable coefficients. The components of the body spin vector are the time dependent quantities in these equations. A computer program was developed to solve the equations by numerical methods. Results of the program include: body spin vector components and their rates of change, position of the system center-of-mass, acceleration of various points in the system, and body orientation change. (Author)

AD-610 286 Div. 16, 30
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A SIMPLE CAPACITIVE DISPLACEMENT MEASURING SYSTEM.
Final rept. for Mar 62-Jul 64,
by Lothar O. Hoeft. Dec 64, 23p AMRL-TR-64-116
Proj. 7232, Task 723204

Unclassified report

Descriptors: (*Biophysics, Measuring devices (Electrical and electronic)), (*Measuring devices (Electrical and electronic), Biophysics), Guinea pigs, Nervous system, Physiology, Acoustic properties, Acoustic impedance, Capacitance, Circuits, Ear, Space medicine, Medical research, Mathematical analysis.

This report presents the theory, development and performance of a capacitive displacement detector. The detector senses the displacement changes as changes in the capacitance of a probe located near the body whose displacement is being measured. These capacitance changes are converted into frequency changes by placing the capacitance probe in the tank circuit of an oscillator. The frequency changes are converted into voltage changes by standard FM techniques. The capacitance detector has a sensitivity of 30 volts/rho farad. When used with a 0.2 cm diameter probe, the displacement sensitivity was 4.78 volts/cm when the probe to surface distance was 0.1 cm. The noise level was low enough so that the system was able to measure displacements of the order of .00001 cm at frequencies below 1000 cps and displacements of the order of 5 x .000001 cm at frequencies above 1000 cps. The main advantages of this type of displacement detector over others is the ease of construction and adjustment. (Author)

AD-610 300 Div. 16
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MEDICAL RADIOLOGY, 1964, VOL. 9, NO. 3: SELECTED ARTICLES.
11 Jan 65, 27p FTD-TT-64-746
TT 65 61012

Unclassified report

Unedited rough draft trans. of Meditsinskaya Radiologiya (USSR) 1964, v. 9, no. 3, p. 52-66.

Descriptors: (*Radiobiology, Medical research), Radiation effects, Eye, Vision, Radiological dosage, Radiation sickness, Ophthalmology, Gamma rays, Neutrons, Mice, Sublethal dosage, Histological techniques, Leukocytes, Bone marrow, Metabolism, Morphology (Biology), USSR.

Contents: (1) State of the organ of vision under the effect of gamma neutron radiation in dosages close to maximum permissible; (2) Dosage characteristics and peculiarities of being affected during exposure of mice to gamma-irradiation of a dosage power; (3) Histochemical changes in leukocytes at experimental radiation illness.

AD-610 314 Div. 16, 28
OTS Prices: HC $8.70/MF $2.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CURRENT PROBLEMS OF PSYCHIATRY AND NEUROPATHOLOGY,
ed. by G. V. Morozova. 21 Nov 64, 566p
FTD-TT-64-650
TT 65 61014

Unclassified report

Unedited rough draft trans. of mono. Aktual'nye Voprosy Psikhiatrii i Nevropatologii, Moscow, 1963, 395p.

Descriptors: (*Psychiatry, Medical research), Neurology, Menal disorders, Pathology, Pharmacology, Abnormal psychology, Psychoses, Neuroses, Serotonin, Cerebral cortex, Brain, Sleep, Surgery, Children, Emotions, Drugs, Diseases, Arboviruses, Histology, Genetics, Addiction, Paralysis, Reserpine, Therapy, Psychotropic agents, Ophthalmology, Glutathione, Sensory deprivation, Electroencephalography, USSR.

Problems associated with psychiatry and neuropathology are discussed in 56 reports by Soviet physicians and psychiatrists. Topics include: (1) pharmacodynamic investigation of the mentally ill; (2) blood analysis of psychotic patients; (3) diffuse disturbances of consciousness in electrophysiological interpretation; (4) electrical activity of the cerebral cortex during hypnotic sleep; (5) the phagocyte reflex; (6) manifestations of manic states; (7) psychoses following heart surgery; (8) hyperkineses; (9) schizophrenia; (10) psychotropic agents; (11) alcoholism; (12) role of heredity in psychoses; (13) psychasthenia; (14) psychopathology of socially small isolated groups; (15) pseudoneuroses; (16) EEG patterns in encephalitis; (17) histopathological studies of senile psychoses; (18) sensory deprivation in ophthalmologic patients; (19) treatment of progressive paralysis; (20) psychotherapy today; (21) hypnotherapy in alcoholism.

AD-610 347 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

CONTENT OF ARGININE, HISTIDINE, LYSINE, TYROSINE, TRYPTOPHAN AND CYSTINE IN ALBUMINA OF VARIOUS TYPES OF MEATS AND FISH,
by A. I. Taranova, E. S. Al'bova, and L. S. Gromikhina.
20 Jan 65, 12p FTD-TT-64-1364
TT 65 61020

Unclassified report

Unedited rough draft trans. of Voprosy Pitaniya (USSR) 1955, v. 14, no. 5, p. 27-35.

Descriptors: (*Nutrition, Foods), (*Meat, Amino acids), (*Fishes, Amino acids), Albumins, Proteins, Diets, Tyrosine, Tryptophan, USSR.

Examinations were carried out for the purpose of stuoying the possibilities of increasing the nutritional value of albumina of food rations by a proper combination of nutritional products. The amino acid composition was investigated in 24 types of meats of domestic animals, fowls and wild life, 20 types of fish and fish products, as well as the meat of a seal (polar delphin), white grampus (annulate, seals), crayfish and crabs.

AD-610 348 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SENSORY REACTIONS OF MAN AND SENSITIVITY OF THE VESTIBULAR ANALYZER UNDER SHORT-TERM WEIGHTLESSNESS,
by E. M. Yuganov, I. A. Sidel'nikov, A. I. Gorshkov, and I. I. Kas'yan. 8 Dec 64, 15p FTD-TT-64-1052
TT 65 61021

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Biologicheskaya, 1964, v. 29, no. 3, p. 369-375.

Descriptors: (*Vestibular apparatus, Weightlessness), (*Weightlessness, Vestibular apparatus), USSR, Motion sickness, Inhibition, Thresholds (Physiology), Adaptation (Physiology), Sensitivity.

Conclusions: The character and degree of manifestation of sensor reactions under short-term weightlessness depend basically on the dissimilar vestibular sensitivity of persons. The results of ground, vestibular testing permit prediction of man's capacity to work in short-term weightlessness. The functional stability of a vestibular analyzer to weightlessness for persons who show no adverse effects (Group I) is determined by a low sensitivity of the vestibular analyzer to an adequate stimulant and by a rather high level of inhibiting effects on the vestibular analyzer as compared to other afferent systems; for persons experiencing illusions in weightlessness (Group 2), by an increased sensitivity of the vestibular analyzer to adequate stimulants and by manifesting the effect of inhibition processes as compared to other analyzers; for persons experiencing motion sickness in weightlessness (Group 3), by a high sensitivity of the vestibular apparatus to adequate stimulants and by a weak inhibition effect of other afferent systems on the vestibular apparatus. (Author)

AD-610 357 Div. 16
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, ILL.
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Quarterly progress rept. for 1 Nov 64-31 Jan 65.
31 Jan 65, 13p IITRI-L6021-1
Contract DA49 193MD2281

Unclassified report

Also see AD-607 486.

Descriptors: (*Insect repellants, Effectiveness), (*Culicidae, Insect repellants), Skin, Permeability, Larvae, Food, Adenine, Nucleotides, Adenosine phosphates, Blood, Thiourea, Mouth.

The object of this program is the development of systemic insect repellents. During the period covered by this report, further characteristics of chemically induced feeding behavior of mosquitoes were determined. In addition, studies on the skin permeability of potential insect repellents were initiated.

17. Metallurgy

AD-609 894 Div. 17, 31
OTS Prices: HC $2.00/MF $0.50

Naval Applied Science Lab., Brooklyn, N. Y.
EFFECT OF PICKLING ON NOTCH-TOUGHNESS, AND SURFACE PITTING OF HY-80/100 TYPE STEEL PLATE.
Progress rept. no. 2,
by F. Ginsberg, I. Geld, I. A. Schwartz and F. D'Oria.
13 Jan 65, 31p
Proj. SR007 01 01
NASL 9300 1

Unclassified report

Descriptors: (*Steel, Pickling), (*Pickling, Steel), Fracture (Mechanics), Toughness, Surface properties, Corrosion, Metal plates, Nickel alloys, Chromium alloys, Molybdenum alloys, Corrosion inhibition, Hydrogen embrittlement, Ship plates.

An investigation was made to develop a uniform and improved pickling procedure for the descaling of HY-80/100 type steel plate. The principal governing criteria were (a) maximum depth of pitting and (b) effect on notch-toughness as evaluated by the Navy tear test. Results indicate the following: (a) HY-80/100 steel plate may be pickled in the standard solution for time intervals up to two hours without adverse effects on the material provided that there is at least a 48 hour interval before fabrication. (b) Windrowing or deep furrowing of plate surfaces observed after removal of the steel from the acid bath is associated with the prior mill processing and not the chemical action of the pickling solution. The following modifications in the pickling procedure are recommended for HY-80/100 type steel: a Pickling times up to two hours should be permitted provided that there is at least a 48 hour interval before fabrication (24 hours currently specified). b For intervals of less than 48 hours, rinse time after pickling should be increased to 30 minutes or the plate should be heated at 200F for at least four hours. Consideration should be given to modification of the inhibitor specification to screen out those inhibitors which might have embrittling effects. (Author)

AD-609 898 Div. 17, 22, 26
OTS Prices: HC $2.00/MF $0.50

Watertown Arsenal Labs., Mass.
THE Ti-6Al-6V-2Sn-0.5Fe-0.25Cu ALLOY AND OTHER ALPHA-BETA TYPE ALLOYS UTILIZED AT WATERTOWN ARSENAL.
Monograph series,
by R. M. Colton and F. J. Rizzitano. 13 Sep 60, 32p
WAL MS21

Unclassified report

Abstract of technical presentation to be given at New York Univ., Titanium Metallurgy Conference, (6th) Lecture no. 11, 12-13 Sep 60.

Descriptors: (*Titanium alloys, Ordnance), (*Material forming, Titanium alloys), Aluminum alloys, Vanadium alloys, Tin alloys, Iron alloys, Copper alloys, Zirconium alloys, Manganese alloys, Nickel alloys, Molybdenum alloys, Chromium alloys, Tensile properties, Ductility, Toughness, Gun components, Ammunition components, Vehicle tracks, Forging, Extrusion, Cold working, Joining, Welding, Welds, Tests, Heat treatment, Mechanical properties, Aging (Materials).

AD-609 901 Div. 17, 4, 25
OTS Prices: HC $1.00/MF $0.50

Army Materials Research Agency, Watertown, Mass.

EMISSION SPECTROGRAPHIC SOLUTION TECHNIQUES WITH APPLICATIONS TO THE ANALYSIS OF URANIUM AND TITANIUM ALLOYS.
Monograph series,
by W. K. Murray. Jun 63, 12p
AMRA MS63 01

Unclassified report

Presented at the Pittsburgh Conference on analytical Chemistry and Applied Spectroscopy in Mar 63.

Descriptors: (*Spectroscopy, Alloys) (*Uranium alloys, Spectroscopy), (*Titanium alloys, Spectroscopy), Metallurgy, Solutions, Electrical properties, Test methods, Molybdenum alloys, Niobium alloys, Aluminum alloys, Vanadium alloys, Zirconium alloys, Nickel alloys, Tin alloys, Chromium alloys, Iron alloys.

A number of titanium alloy solutions each containing 2 percent of tin, zirconium, and columbium, and, in addition, either 10 or 20 percent of aluminum or vanadium were prepared. There was no effect on the determination of the tin, zirconium, or columbium regardless of the presence or absence of the aluminum or vanadium. The effect of changing the matrix element from titanium to iron on the relative intensities observed for nickel and chromium was also investigated. Identical amounts of nickel but varying amounts of chromium were added to a group of three iron samples and two titanium samples. Spectrographic solution techniques were applied to a number of series of alloy types, including columbium, vanadium, iron, and molybdenum base alloys. Applications to titanium and uranium alloys are described briefly. The experimental series of uranium alloys submitted for analysis contained columbium, vanadium, titanium, molybdenum, and zirconium.

AD-609 905 Div. 17
OTS Prices: HC $1.00/MF $0.50

New York Univ., N. Y. School of Engineering and Science.
DEVELOPMENT OF TOUGH, HIGH STRENGTH ALPHA-BETA TITANIUM-BASE ALLOYS AT 240,000-260,000 PSI YIELD STRENGTH LEVEL.
Quarterly progress rept. no. 7, 26 Dec 63-25 Mar 64,
by P. A. Farrar and H. Margolin. 25 Mar 64, 23p
Contract DA30 069ORD3690, Proj. 59332008
WAL TR401303 6

Unclassified report

Descriptors: (*Titanium alloys, Experimental data), Ductility, Impact shock, Tensile properties, Toughness, Hot working, Heat treatment, Metal plates, Melting, Forging, Sheets, Rods, Impurities, Alloys, Tin alloys, Aluminum alloys, Chromium alloys, Copper alloys, Iron alloys, Vanadium alloys, Zirconium alloys, Mechanical properties, Molybdenum alloys, Carbon alloys, Oxygen.

In order to develop titanium alloys with higher ductilities and 0.1% yield strengths in the range of 190,000 to 240,000 psi and usable ductility in the range from 240,000 to 260,000 psi, 30 eight pound ingots were investigated and an additional 26 eight pound ingots are now being evaluated. Four alloys which showed promising properties in the 190,000-240,000 psi range as 8 Lb. ingots were remelted as 80 Lb. ingots for further evaluation as bar, plate and sheet material. Tensile tests at room temperature and -40F impact tests have been completed for three of the alloys at different heat treatments and the data is tabulated in this report. (Author)

AD-609 909 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.

LOW TEMPERATURE MECHANICAL PROPERTIES OF 300 SERIES STAINLESS STEEL AND TITANIUM.
Monograph series,
by Thomas S. Desisto and Frank L. Carr. Aug 60, 17p
WAL MS22

Unclassified report

Descriptors: (*Stainless steel, Cryogenics), (*Titanium, Cryogenics), (*Cryogenics, Alloys), Strain (Mechanics), Stresses, Test equipment, Tensile properties, Iodides, Austenite, Martensite, Cryostats, Mechanical properties.

Instantaneous specimen diameter measurements during tensile deformation can be obtained at -452F. Strain at maximum load for the commercially pure and iodide titanium increases with decreasing temperatures. Strain at maximum load for the 300 series stainless steels generally decreases with decreasing temperature to -319F but increases sharply at -452F. The true stress-strain curves obtained at -452F on the 300 series stainless steels do not represent the strain hardening properties of one particular region of the bar as at higher temperatures, but represents the upper envelope of flow stress for various austenite-martensite structure. (Author)

AD-609 912 Div. 17, 25
OTS Prices: HC $4.00/MF $1.00

Air Force Cambridge Research Labs., Bedford, Mass.
CONTINUOUS ZONE REFINING.
Special repts.,
by John K. Kennedy and N. Grier Parke, III. Dec 64, 136p
Proj. 5620
AFCRL 64 963; AFCRL SR14

Unclassified report

Descriptors: (*Refining (Metallurgy), Zone melting), (*Zone melting, Theory), Equations of state, Purification, Mathematical models, Density, Impurities, Boundary value problems, Crystallization, Graphics, Melting, Materials, Semiconductors, Freezing, Transport properties.

This report is an effort to collect under one cover the existing theory of three continuous zone refining systems; the zone-void system, the zone-transport system and the matter transport system. The steady-state equations which describe these systems are derived using consistent terminology and under boundary conditions which account for the density change due to melting. The newly developed nondimensional steady-state equations are also derived and the results of an extensive computer study based on these equations are presented in graphical form. (Author)

AD-609 916 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF ULTRASONIC VIBRATIONS ON THE CRYSTALLIZATION AND PROPERTIES OF ALLOYS,
by V. S. Smirnov and A. F. Churnovskii. 2 Dec 64, 13p
FTD TT64 368; TT 65 60697

Unclassified report

Unedited rough draft trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) 1963, no. 222, p. 8-14.

Descriptors: (*Alloys, Ultrasonic radiation), (*Ultrasonic radiation, Alloys), (*Crystallization, Alloys), (*Semiconductors, Ultrasonic radiation), Bismuth alloys, Tellurium alloys, Selenium alloys, Microstructure, Hardness, Castings, Powder alloys, Thermoelectricity, Electrical properties, Degasification, Tensile properties.

An investigation was made of the action of vibrations of USF, on the process of crystallization on the triple semiconductor alloys Bi2Te3-Bi2Se3 and St2Te3 -Bi2Te3. Study of the macro- and microstructure of the sonicated alloys, proves the possibility of obtaining ingots with fine-crystalline structure, and more uniformity in physical properties, than under ordinary conditions of casting. The specimens tested for microhardness and measurement of their electrical properties, show that the sonication of the fused mass, considerably heightens the microhardness and strength of the aloloys, and does not change their electrical properties as compared with alloys obtained by the ordinary procedure. The action of the oscillations of SSF, on the process of crystallization of thermoelectric alloys, as a new method of obtaining thermoelements gave positive results, and requires further development.

AD-610 003 Div. 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
SOME THEORETICAL AND PRACTICAL CONSIDERATIONS IN VACUUM INDUCTION MELTING OF URANIUM ALLOYS.
Monograph series,
by Philip S. Schaffer. 12 May 61, 18p
WAL MS33

Unclassified report

Presented at the American Foundrymen's Society Castings Congress, San Francisco, California, 8-12 May 1961.

Descriptors: (*Uranium alloys, Refining (Metallurgy)), (*Refining (Metallurgy), Uranium alloys), Melting, Vacuum furnaces, Induction heating, Casting, Degasification, Ductility, Molding, Mechanical properties, Zirconium compounds, Silicon compounds, Dioxides, Sand, Thermodynamics.

Procedures of melting, refining and casting of depleted uranium alloys are developed utilizing vacuum induction melting techniques, a hand-rammed commercially pure magnesia crucible and a phosphate-bonded zircon sand mold. It is believed that this combination yields a melting and casting procedure that results in a reduction of residual gas content; secondly, minimizes crucible-melt reactions; and thirdly, avoids possible metal-mold reactions. Optimum results with this procedure are obtained by pouring the molten uranium under dynamic vacuum conditions to obtain a stream degassing effect and then introducing a positive pressure of inert gas immediately upon filling the mold, in order to prevent nucleation and possible evolution of gas during solidification. The overall processing procedure results in a reduction of residual gas concentration in the uranium alloy and produces castings with ductile qualities in the as-cast condition. (Author)

AD-610 016 Div. 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
MICROSTRUCTURE OF URANIUM STEELS.
Monograph series,
by Everett L. Reed. Apr 61, 15p
WAL MS27

Unclassified report

Descriptors: (*Steel, Uranium alloys), (*Uranium

alloys, Steel), (*Microstructure, Uranium alloys), Carbon alloys, Metallography, Hardness, Heat treatment, Mechanical properties, Pearlite, Carbides, Austenite, Grain boundaries.

Metallographic studies were conducted on small vacuum-melted steel ingots made from a 0.59% carbon ingot iron base to which uranium was added in the range of 1.33% to 2.37%. It was determined that uranium in excess of 1.33% resulted in an iron-uranium complex carbide segregation which persisted in the structure after austenitizing at 1500F. An increase of uranium in the range studied failed to increase the hardness of the annealed steels but produced a noticeable increase in hardness of the quenched series. Traces of fine peralite were present in some of the quenched uranium steels. An increase in carbon content of these steels may have contributed to the increase in hardness. The mechanical properties of these high uranium steels would be impaired by the presence of these iron-uranium complex carbides in the grain boundaries. (Author)

AD-610 017 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
TITANIUM: ALLOY DEVELOPMENT, PROCESSING AND PRODUCTION APPLICATIONS.
Monograph series,
by Milton M. Mardirosian and Robert M. Colton.
Jul 61, 9p
WAL MS29

Unclassified report

Descriptors: (*Titanium alloys, Processing), (*Thermal joining, Titanium alloys), Aluminum alloys, Vanadium alloys, Tin alloys, Manganese alloys, Iron alloys, Copper alloys, Mechanical properties, Heat treatment, Machining, Welding, Brazing.

Contents: Processing of titanium; Alloy development and mechanical properties; Fabrication problems; Welding processes; Brazing processes

AD-610 018 Div. 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
TRUE STRESS-STRAIN PROPERTIES OF HIGH-STRENGTH SHEET SPECIMENS.
Cooperative study,
by Frank R. Larson and John Nunes. Aug 61, 10p
WAL MS31

Unclassified report

Prepared in cooperation with NRL, NASA, and SRI.

Descriptors: (*Sheets, Deformation), (*Deformation, Sheets), Fracture (Mechanics), Stresses, Strain (Mechanics), Hardening, Anisotropy, Steel, Stainless steel, Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Molybdenum alloys, Toughness, Tensile properties.

The plastic flow and fracturing properties of smooth sheet tensile specimens were determined by utilizing special instrumentation which has previously been developed to measure instantaneous values of the width, thickness and load. From these measurements the basic plastic flow characteristics in the form of true stress-strain curves were calculated. In addition to this, information on strain hardening and mechanical anisotropy was also determined. Due to the limited ductility of these specimens, some difficulty was encountered, particularly with the B120VCA Titanium Alloy. Also, because of the limited number of specimens tested and the inherent difficulties associated with low ductilities in this type of testing, it appears wise to consider these test results as tentative. The test specimens were H-11 or Vascojet 1000, B120VCA and 301 stainless steel cold rolled 70%.

AD-610 035 Div. 17, 25, 26
OTS Prices: HC $2.00/MF $0.50

Linde Div., Union Carbide Corp., Indianapolis, Ind.
FABRICATION AND PROPERTIES OF TUNGSTEN SINGLE CRYSTALS.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 64,
by F. R. Charvat, G. W. Edwards, and J. W. Arthur.
28 Dec 64, 27p
Contract NOw64 0055c

Unclassified report

Rept. includes Growth of Single Crystal Tungsten to be Used for Rolling into Single Crystal Sheet, Technical rept. for 1 Sep-30 Nov 64; Philco Research Labs. pub. no. U-2918.

Descriptors: (*Tungsten, Single crystals), (*Single crystals, Tungsten), (*Crystal growth, Single crystals), (*Rolling (Metallurgy), Single crystals), (*Sheets, Single crystals), Tungsten alloys, Niobium alloys, Machining, Crystal structure, Deformation, Powder metallurgy, Heat treatment, Hardness, Tensile properties, Ductility.

Thirty-six high purity tungsten and seven tungsten-0.6% niobium crystals were grown by the Arc-Verneuil method. Six and two crystals respectively were selected for machining into rectangular billets on the basis of minimum crystal misorientation. Studies of the substructural changes accompanying deformation by rolling at 1000C have been completed on four crystallographic combinations of rolling plane and rolling direction. The anisotropic hardness of the annealed crystals has been carefully documented along with the anisotropic hardening present in the rolled crystals. Measurement of strength, ductility and macroscopic dimensional changes of the billet during rolling have been completed. Rolling parameters such as contact angle, rolling stresses, coefficient of friction during warm working, and specimen thickness have been evaluated and related to the lattice bending introduced into the crystals during rolling. Since different substructure can be developed in the same crystal by varying the rolling procedure, preliminary recrystallization studies have indicated a strong dependence of the recrystallization temperature on processing techniques.

AD-610 046 Div. 17
OTS Prices: HC $2.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
EMBRITTLEMENT BY LIQUID METALS.
Summary rept. for 1 Mar-1 Dec 64,
by William R. Goggin. 31 Dec 64, 27p
Contract Nonr440800, Projs. NR036 058, PMU4925

Unclassified report

Descriptors: (*Brittleness, Metals), (*Liquid metals, Corrosive liquids), (*Metals, Corrosion), (*Corrosive liquids, Liquid metals), Fracture (Mechanics), Aluminum, Gallium, Alloys, Diffusion, Grain boundaries, Microstructure, Electron microscopy.

An electron microscopic investigation of the mechanics of liquid metal embrittlement is described. Specimen preparations, techniques, and tentative conclusions are reported on the aluminum-gallium couple. (Author)

AD-610 196 Div. 17, 1, 10
OTS Prices: HC $3.00/MF $0.75

Phillips Petroleum Co., Bartlesville, Okla.
EFFECT OF JP-5 SULFUR CONTENT ON HOT CORROSION OF SUPERALLOYS IN MARINE ENVIRONMENT.
Progress rept. no. 2,
by H. T. Quigg and R. M. Schirmer. 31 Dec 64, 86p
PPC-3945-64R
Contract NOw64 0443d
Unclassified report

Descriptors: (*Sulfur, Aviation fuels), (*Nickel alloys, Corrosion), (*Cobalt alloys, Corrosion), (*Corrosion, Aviation fuels), Environmental tests, High-temperature research, Aircraft engines, Gas turbine blades, Gas turbine nozzles, Corrosion-resistant alloys, Combustion products, Heat-resistant metals and alloys, Chromium alloys, Molybdenum alloys, Tungsten alloys, Aluminum alloys, Titanium alloys, X-ray diffraction analysis, Metallography, Sea water, Experimental data, Statistical analysis.

An exploratory program was made to provide a basis for a subsequent factorial experiment to determine whether the maximum sulfur content of 0.40 weight per cent, currently allowed in grade JP-5 aviation turbine fuel, is a safe level for the protection of turbine blade alloys used in high-performance engines. Specimens of six different superalloys mounted in a cascade holder were exposed to vitiated air from the Phillips 2-inch combustor during a five hour cyclic test. Operating conditions were varied to investigate the effect of gas temperature, pressure and velocity at the test specimens, combustor air-fuel ratio, sea salt ingestion rate, and test specimen position in the cascade. Evaluations were based upon metal loss, scale analysis and metallographic examination of the test specimens. The desirability of two experiments was shown; one at gas temperatures of 1800 F and above, where fuel sulfur inhibited hot corrosion, and the other below the melting point of sodium sulfate (1623 F), where fuel sulfur accelerated hot corrosion. Analysis of the data obtained indicates that the effects of other test variables on hot corrosion is a function of mass exposure to 'sea salt' and fuel sulfur. (Author)

AD-610 234 Div. 17
OTS Prices: HC $4.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF DIFFUSION IN THE COLUMBIUM VANADIUM SYSTEM.
Master's thesis,
by Robert Charles Geiss. Aug 62, 112p GA/Mech-62-2
Unclassified report

Descriptors: (*Niobium alloys, Vanadium alloys), (*Vanadium alloys, Niobium alloys), (*Diffusion, Solid solutions), Partial differential equations, Theory, Heat of activation, Preparation, Electron microscopy, Frequency, Crystal lattices, Crystal lattice defects, Experimental data, Probes (Electromagnetic).

Diffusion rates in the Cb-V system were investigated using electron microprobe analysis of the diffusion zones to determine concentration gradients. The interdiffusion coefficient, D, was found using a computer program to solve the Matano-Boltzman method. Activation energies, Q, and frequency factors, Do, were derived from values of D at the same concentrations but at different temperatures. A partial list of Do and Q for interdiffusion (in lattice parameter measure) as a function of composition is: 5 a/o Cb; Q = 59.8 Kcal/mol, Do = 5.3x10 to the 16th power 1 sq P/hr; 55 a/o Cb; Q = 48.1 Kcal/mol, Do = 9.5x10 to the 14th power 1 sq P/hr; 95 a/o Cb; Q = 69.4 Kcal/mol, Do = 7.0x10 to the 15th power 1 sq P/hr. Movement of tungsten Kirkendall markers at 12.7 a/o Cb and 1404C. during the diffusion anneal indicated D sub V > D sub Cb. Diffusion in the Cb-V system is apparently by a vacancy mechanism. (Author)

AD-610 235 Div. 17
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF THE GAMMA PHASE OF THE TITANIUM-ALUMINUM BINARY ALLOY WITH ZIRCONIUM ADDITIONS.
Master's thesis,
by Duane H. Troup. Aug 62, 99p GAW/Mech-62-16
Unclassified report

Descriptors: (*Titanium alloys, Phase studies), (*Aluminum alloys, Phase studies), Zirconium alloys, Corrosion-resistant alloys, Tensile properties, Hardness, Brittleness, Ductility, Metallography, X-ray diffraction analysis, Crystal lattices, Crystal structure, Solubility, Solid solutions.

The titanium-aluminum equiatomic alloy has qualities of excellent corrosion resistance, good strength to weight ratio, and good hot hardness. These qualities would make this alloy a desirable structural material were it not for an inherent brittleness and lack of ductility. The brittleness is attributed to an ordered-face-centered-tetragonal cell with a c/a ratio of 1.020. Several attempts have been made to reduce the c/a ratio to unity through ternary additions. A reduction of this ratio to 1.006 has been reported with zirconium as the ternary addition; however, this value was attained outside of the gamma phase. During this investigation the limit of solubility of zirconium in the gamma phase at 2325F was determined to be slightly less than 10a/o at 55a/o aluminum and slightly more than 10a/o at 60a/o aluminum. The c/a ratio varied with composition from 1.016 to 1.030. (Author)

AD-610 236 Div. 17, 25
OTS Prices: HC $3.00/MF $0.50

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STUDY OF QUENCH-HARDENING IN SILVER.
Master's thesis,
by John Raymond Albright. Aug 62, 52p
GAW/Mech-62-8
Unclassified report

Descriptors: (*Silver, Hardening), (*Aging (Materials), Silver), Aging (Materials), Deformation, Crystal lattice defects, Heat of activation, Impurities, Wire, Heat treatment.

Silver wires of 10 mil diameter have been quenched from 900±15C at an average quenching rate of 100000C/sec. Isothermal aging kinetics have been investigated by means of room temperature 0.4 per-cent-yield-strength measurements. The incubation periods that were observed for the 300C, 400C, and 450C aging temperatures indicated that excess single vacancies formed di-vacancies and tri-vacancies which served as nuclei for the formation of hardening complexes. The maximum strength developed at these temperatures was 10.0 kg/sq mm and it is postulated that this strength resulted from the formation of dislocation loops and stacking fault tetrahedra. The 500C and 550C aging temperatures developed a yield strength of only 7.3 kg/sq mm and

hardening at this aging temperature is assumed to be due to dislocation loops only. The activation energy for the 300C to 450C hardening mechanism was found to be 0.67 ± .03 eV. This is the activation energy associated with the migration of single vacancies. (Author)

AD-610 241 Div. 17
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
OXIDATION OF RENE 41 AND THORIATED NICKEL WIRES BETWEEN 1600 F AND 2000 F.
Master's thesis,
by Robert Alan Rosenberg. Jun 64, 89p GAW/Mech-64-18

Unclassified report

Descriptors: (*Nickel alloys, Oxidation), (*Wire, Nickel alloys), Wire, Chromium alloys, Cobalt alloys, Molybdenum alloys, Iron alloys, Titanium alloys, Aluminum alloys, Thorium alloys, Thorium compounds, Dioxides, Aluminum compounds, Oxides, Gravimetric analysis, Scale, Nickel compounds, Stresses, Nickel, Metallography, Experimental data.

Oxidation rates of 10 and 20 mil nickel-base superalloy wires, Rene 41 and Thoriated Nickel, were measured over the range 1600 F to 2000 F for up to 1000 minutes using gravimetric methods. Rene 41 wire oxidation was characterized by the rapid growth of A1203 caused by a high concentration gradient of aluminum. Formation of this protective A1203 scale resulted in much slower oxidation of chromium from the normal parabolic rates observed for 50 mil Rene 41 sheet. A theoretical analysis based on diffusion theory for cylindrical shapes was presented to explain the measured oxidation rates. TD Nickel oxidation exhibited a parabolic rate of reaction, controlled by the growth of NiO. Both alloys suffered increases in oxidation rates with increases in temperature. Oxidation of Rene 41 wire increased with the application of stress, while TD Nickel oxidation was insensitive to stress. Internal oxidation (A1203) of Rene 41 occurred, whereas the high density surface scale of TD Nickel and lack of alloys within its matrix prevented internal oxidation. Neither alloy appeared sensitive to a decrease in 02 partial pressure. (Author)

AD-610 262 Div. 17, 8, 25
OTS Prices: HC $3.00/MF $0.75

Stanford Electronics Labs., Stanford Univ., Calif.
ANALYTICAL STUDY OF ZINC-DIFFUSION IN GALLIUM ARSENIDE AND THE ELECTRICAL PROPERTIES OF THE RESULTING DIFFUSED LAYERS,
by Rajendra Mehta. Jun 64, 71p SEL-64-062, SEL-TR-5103-1
Contracts DA31 124ARO D155, AF33 616 7726

Unclassified report

Descriptors: (*Semiconductors, Electrical properties), (*Zinc, Diffusion), (*Gallium alloys, Arsenic alloys), Impurities, Preparation, Partial differential equations, Differential equations, Surface properties, Electrical conductance, Resistance (Electrical), Crystal lattice defects.

This study undertakes: first, to establish the relationship of these anomalous profiles to the diffusion equation; second, to calculate the relationship among the parameters of the zinc-diffused layers; and third, to measure the resistivity of GaAs as a function of zinc concentration. The results of this study provide: first, a procedure for calculating concentration profiles for various surface concentrations for a system such as zinc in GaAs when only two experimentally measured profiles are known; second, design data concerning the electrical properties of the zinc-diffused layers; and third, measurements of resistivity as a function of zinc concentration in heavily doped GaAs.

AD-610 269 Div. 17, 26
OTS Prices: HC $2.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATIONS ON HIGH STRENGTH ALLOYS AND RIVET LIKE CRYSTALS: REPORTS OF SCIENTIFIC SESSIONS, 1962: SELECTED ARTICLES.
18 Dec 64, 40p FTD-TT-64 767
TT 65 60975

Unclassified report

Unedited rough draft trans. of mono. Issledovaniya pb Vysokoprochnym Splavam i Nitevidnym Kristallam: Doklady na Nauchnoi Sessii, Moscow, 1963, p. 54-60, 98-107, 142-147.

Descriptors: (*Steel, Mechanical working), (*Titanium alloys, Mechanical working), (*Mechanical working, Alloys), Heat treatment, Deformation, Austenite, Hardness, Mechanical properties, Martensite, Microstructure, Plasticity, Grain structures (Metallurgy), Impact shock, USSR.

Contents: Effect of low-temperature thermomechanical treatment on the properties of steel, by V. D. Sadovskiy, L. V. Smirnov, and G. M. Filonchik; Effect of deformation of austenite on the properties of steel following quenching, by L. I. Kogan, V. I. Sarrak, and R. I. Entin; Thermomechanical treatment of titanium alloys, by A. P. Gulyayev, and A. S. Shigarev.

AD-610 299 Div. 17, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
HIGH TEMPERATURE ARRANGEMENT FOR TESTING LONG LASTING STRENGTH AND CORROSION STABILITY OF STRUCTURAL MATERIALS IN LIQUID SODIUM,
by V. I. Nikitin. 14 Jan 65, 11p FTD-TT-64-704
TT 65 61011

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) 1963, v. 10, no. 5, p. 80-83.

Descriptors: (*Corrosion, Liquid metals), (*Sodium, Corrosive liquids), (*Liquid metals, Compatibility), (*Steel, Corrosion), (*Nickel alloys, Corrosion), Stainless steel, Chromium alloys, Austenite, High-temperature research, Test methods, Stability, Test equipment, USSR.

This report describes structural features of a lab arrangement for testing corrosion resistance and strength of structural materials in a sodium stream at a temperature of up to 1000C. Given are results of brief corrosion testing of nickel base alloys and chromium nickel austenitic steel at 1000C.

AD-610 325 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

Cr-Ti PHASE DIAGRAM,
by V. N. Svechnikov, Yu. A. Kocherzhinskii, and V. I. Latysheva. 9 Jan 65, 8p FTD-TT-64-680
TT 65 61041

Unclassified report

Unedited rough draft trans. of Akademiya Nauk URSR, Kiev. Instytut Metallofizyky. Sbornik Nauchnykh Rabot, 1962, v. 16, p. 132-135.

Descriptors: (*Chromium alloys, Titanium alloys), (*Phase studies, Chromium alloys), (*Titanium alloys, Chromium alloys), Solid solutions, Temperature, Dilatometers, Solubility, X-ray diffraction analysis, Thermal properties, USSR.

AD-610 332 Div. 17, 32
OTS Prices: HC $1.00/MF $0.50

Belfour Engineering Co., Suttons Bay, Mich.
RENE' 41 NICKEL BASE ALLOY.
Inventory rept.
Sep 63, 24p BEC-IR-613
Contract AF33 615 1061

Unclassified report

Descriptors: (*Nickel alloys, Mechanical properties), (*Information retrieval, Mechanical properties), Tensile properties, Data storage systems, Data.

This report is designed to acquaint the aerospace industries with the content and use of the Mechanical Properties Data Center. Since the total system content of over 1,000,000 data points is too large to conveniently display under one cover, this report deals only with data in storage as of this date on the subject material. The Mechanical Properties Data Center is designed to retrieve data meeting specific requirements of the requestor thereby relieving him of manually searching through referenced reports for data satisfying his needs. While this inventory does present some graphical displays of the material's performance, these are shown only for the purpose of demonstrating possible uses of the system. Tabulated as well as graphical displays are common forms of output.

AD-610 333 Div. 17, 32
OTS Prices: HC $1.00/MF $0.50

Belfour Engineering Co., Suttons Bay, Mich.
AISI H-13 HOT WORK DIE STEEL.
Inventory rept.,
Aug 64, 13p BEC-IR-620
Contract AF33 615 1061

Unclassified report

Descriptors: (*Tool steel, Mechanical properties), (*Information retrieval, Mechanical properties), Data storage systems, Data, Chromium alloys, Hardening, Heat treatment, Foraging, Machining, Welding.

This report is designed to acquaint the aerospace industries with the content and use of the Mechanical Properties Data Center. Since the total system content of over 2,000,000 data points is too large to conveniently display under one cover, this report deals only with data in storage as of this date on the subject material. The Mechanical Properties Data Center is designed to retrieve data meeting specific requirements of the requester thereby relieving him of manually searching through referenced reports for data satisfying his needs.

AD-610 344 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

TENDENCY OF STEEL TOWARD CORROSION CRACKING IN VARIOUS MEDIA,
by F. F. Azhogin and Yu. K. Pavlov. 9 Dec 64, 10p
FTD-TT-64-643
TT 65 61017

Unclassified report

Unedited rough draft trans. of mono. Korroziya i Zashchita Metallov: Sbornik Statei (Corrosion and Protection of Metals: Collection of Articles) Moscow, 1962, p. 112-117.

Descriptors: (*Steel, Corrosion), (*Corrosion, Steel), Environmental tests, Stresses, Pickling compositions, Fracture (Mechanics), Salt spray tests, Tropical tests, Sulfuric acid, Sodium compounds, Chlorides, Corrosive liquids, Corrosive gases.

Tests were made of the corrosion cracking tendency of high strength steel in solutions of 20% H_2SO_4 with NaCl (30 g/l) admixture with results of testing in a fresh humid chamber, salt haze chamber, imitating tropical conditions, and in an atmosphere of an industrial region. It was established, that with the increase in critical stress, derived when testing stressed samples in a 20% H_2SO_4 solution with an admixture of 30 g/l NaCl, the time until the beginning of cracking of the stressed steel (145 kg/ sq mm) increases in the mentioned media. Steel of various fusions having critical stress values, when testing in a pickling solution, of more than 50 kg/sq mm) is not inclined toward corrosion cracking in an atmosphere of an industrial region. Tests in 20% H_2SO_4 with addition of 30 g/l NaCl solution may serve as bases for the development of a rapid method for the determination of the tendency of high strength steel toward corrosion cracking. (Author)

AD-610 349 Div. 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF SMALL ADDITIONS OF OXIDES OF YTTRIUM, LANTHANUM, AND CERIUM ON CERTAIN MAGNETIC CHARACTERISTICS OF MAGNESIUM-MANGANESE FERRITES AND THE X-RAY SPECTRA OF TRANSITIONAL METALS IN THEM,
by E. E. Vaynshteyn and A. I. Gunchenko.
18 Dec 64, 12p FTD-TT-64-450
TT 65 61022

Unclassified report

Unedited rough draft trans. of Poroshkovaya Metallurgiya (USSR) 1962, v. 2, no. 6, p. 72-80.

Descriptors: (*Ferrites, Rare earth compounds), (*Rare earth compounds, Ferrites), (*Magnetic properties, Ferrites), (*Absorption spectrum, Ferrites), Yttrium compounds, Lanthanum compounds, Cerium compounds, Oxides, Magnesium compounds, Manganese compounds, Atomic energy levels, Microstructure, USSR.

A study was made of the effect of admixtures of lanthanum, cerium and yttrium oxides on the magnetic characteristics of manganese and magnesium-manganese ferrites. This effect differs for various rare-earth elements and depends on their content in the ferrite. The fine structure of the X-ray absorption spectra of iron and manganese in ferrites with various quantities of additions of rare-earth elements was investigated. On the basis of an analysis of the experimental data inferences were drawn as to the possible mechanism of the effect of admixtures on the energetic state of the atoms of the basic components in the ferrites. (Author)

AD-610 350 Div. 17, 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

HIGH STRENGTH STEEL,
by D. A. Prokoshkin. 12 Jan 65, 25p FTD-TT-64-679
TT 65 61023

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR, Institut Metallurgii, Moscow. Trudy, 1963, no. 13, p. 108-121.

Descriptors: (*Steel, Metallurgy), Heat treatment, Stainless steel, Austenite, Mechanical working, Hardening, Deformation, Mechanical properties, Martensite, Magnetic properties, Electromagnetic fields.

Methods for obtaining high strength steel are discussed. The methods include: hardening with low annealing, patentizing, thermo-mechanical processing with deformation of supercooled austenite, gradual hardening, thermomechanical treatment with hot plastic deformation, and thermomagnetic treatment.

AD-610 358 Div. 17
OTS Prices: HC $1.00/MF $0.50

IIT Research Inst., Chicago, Ill.
EMBRITTLEMENT OF METALS BY ORGANIC LIQUIDS.
Quarterly rept. for 1 Sep-30 Nov 64.
6 Jan 65, 8p IITRI-B183B2-7
Contract DA11ORD022 3108 Unclassified report

Descriptors: (*Metals, Organic compounds), (*Steel, Brittleness), (*Organic compounds, Corrosive liquids), Fatigue (Mechanics), Water, Absorption, Dehydration, Mineral oils, Degradation, Fracture (Mechanics), Stresses, Calcium compounds, Sulfates, Compatibility.

It is shown that the Rebinder effect involving the embrittlement of steel by organic liquids is in reality due to water absorption by the organic species. The organic liquids which normally cause early fatigue do not produce this effect in the presence of a strong dehydration agent. (Author)

18. Military Sciences and Operations

AD-610 202 Div. 18
OTS Prices: HC $7.30/MF $2.00

Air Force Systems Command, Washington, D. C.
WEAPON SYSTEM EFFECTIVENESS INDUSTRY ADVISORY COMMITTEE (WSEIAC). VOL. III. PREDICTION-MEASUREMENT (TECHNICAL SUPPLEMENT).
Final rept., Task group 2, vol. 3,
by D. F. Barber and C. R. Knight. Jan 65, 427p
AFSC-TR-65-2 V3

Unclassified report

Descriptors: (*Weapon systems, Air Force), Effectiveness, Systems engineering, Air force equipment, Tactical weapons, Fighters, Bombers, Guided missiles (Surface-to-surface), Threat evaluation, Radar equipment, Warning systems, Spacecraft, Reliability, Mathematical models, Mathematical prediction.

This technical supplement is concerned primarily with four examples of effectiveness evaluations. The systems involved are: The avionics system in a tactical fighter-bomber; a squadron of intercontinental ballistic missiles; a fixed radar surveillance and threat evaluation system; and, a spacecraft system. In addition to the variety of system types included, an attempt has been made to illustrate procedures employed at different phases of development. The evaluation of the Avionics system takes place during Program Definition; the ICBM squadron, during Operation; the Radar system, during Definition and Operation; and, the Spacecraft, during Acquisition. Since evaluation during the Conceptual phase will generally be based on a gross comparison with existing, similar systems, it was not felt that an example of such an analysis was necessary. Further, each example is intended to illustrate to a different level of detail, various aspects of the evaluation. The avionics system example, for instance, shows the possibility of combining independent evaluations of several subsystems. The radar example shows simplifications which can be made in order to minimize the number of system states to be considered.

AD-610 203 Div. 18, 26
OTS Prices: HC $4.00/MF $0.75

Air Force Systems Command, Washington, D. C.
WEAPON SYSTEM EFFECTIVENESS INDUSTRY ADVISORY COMMITTEE (WSEIAC). VOL. II. PREDICTION-MEASUREMENT (CONCEPTS, TASK ANALYSIS, PRINCIPLES OF MODEL CONSTRUCTION).
Final rept., Task group 2, vol. 2,
by D. F. Barber and C. R. Knight. Jan 65, 114p
AFSC-TR-65-2 V2

Unclassified report

See also AD-610 204.

Descriptors: (*Weapon systems, Effectiveness), (*Systems engineering, Weapon systems), Mathematical models, Reliability, Simulation, Guided missiles, Radar equipment, Fire control systems, Communication systems, Doppler navigation.

Concepts of system effectiveness including the three principal terms, availability, dependability, and capability, are presented. Eight specific tasks required to evaluate effectiveness during any phase of system life are presented. A mathematical routine appropriate to effectiveness model construction is described. Using the above task analysis and the model framework, a hypothetical example is presented. Results of the evaluation illustrate effectiveness analysis methods and possible alternate decisions available. Application of simulation methods to the example are discussed. The appendixes contain summaries of four typical examples of the application of effectiveness evaluation methods to various Air Force systems. An airborne avionics system, an intercontinental ballistic missile system, a long range radar surveillance system, and a spacecraft system are described. (Author)

AD-610 204 Div. 18, 26
OTS Prices: HC $1.00/MF $0.50

Air Force Systems Command, Washington, D. C.
WEAPON SYSTEM EFFECTIVENESS INDUSTRY ADVISORY COMMITTEE (WSEIAC). VOL. I. PREDICTION-MEASUREMENT (SUMMARY, CONCLUSIONS AND RECOMMENDATIONS).
Final rept., Task group 2, vol. 1,
by D. F. Barber and C. R. Knight. Jan 65, 25p
AFSC-TR-65-2 V1

Unclassified report

Descriptors: (*Weapon systems, Effectiveness), (*Management engineering, Reviews), Systems engineering, Analysis, Air Force, Measurement.

Concepts of system effectiveness measurement and prediction, presented in detail in Volume II (AD-610 203), are summarized briefly in this volume. Eight formalized tasks necessary to evaluate effectiveness are reviewed. Summaries of four illustrative examples are given. These examples provide useful guidelines for effectiveness evaluation at various phases of system life cycle. Conclusions concerning the present state of system effectiveness evaluation are presented. A series of recommendations are proposed for Air Force adoption. (Author)

AD-610 205 Div. 18, 26
OTS Prices: HC $3.00/MF $0.75

Air Force Systems Command, Washington, D. C.
WEAPON SYSTEM EFFECTIVENESS INDUSTRY ADVISORY COMMITTEE (WSEIAC). REQUIREMENTS METHODOLOGY.
Final rept., Task group 1,
by N. L. Murray. Jan 65, 77p AFSC-TR-65-1

Unclassified report

Descriptors: (*Weapon systems, Effectiveness), (*Military requirements, Weapon systems), Management engineering, Specifications, Military publications, Air Force, Systems engineering.

The objective of Task Group I was 'To review present procedures being used to establish system effectiveness requirements and recommend a method for arriving at requirements that are mission responsive.' Applicable documents were examined, including Department of Defense Directives and Instructions, Air Force Regulations, Manuals, Specifications, Office Instructions, etc., that might be used to establish effectiveness requirements. Detailed examination of the Specific Operational Requirement (SOR) and the companion Directorate Office Instruction (DOI) 11-7 resulted in the preparation of a proposed Air Force Manual. This document provides checklists,

guidelines, and procedures for SOR preparation that include the significant elements of system effectiveness. A proposed Air Force Regulation was developed to formalize a program of effectiveness evaluation and prediction for the system life cycle. Policy, concepts, and major command responsibilities are developed. Additional conclusions and recommendations are submitted relative to effectiveness requirements that constitute necessary steps to development of an Air Force wide system effectiveness management program. (Author)

AD-610 330 Div. 18, 22
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COSMOS, ON EARTH AND UNDER THE EARTH, by M. Pavlov. 14 Jan 65, 8p FTD-TT-64-824 TT 65 61031
Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, 9 Jan p. 4.

Descriptors: (*Nuclear explosions, United States), High altitude, Underground Explosions, Nuclear weapons, Radioactive fallout, Rockets, Radiation damage, Radiation effects, Astronauts, Shock tubes, Shock waves, Cold war, USSR.

19. Navigation

AD-610 000 Div. 19, 6, 31
OTS Prices: HC $1.00/MF $0.50

Southwest Research Inst., San Antonio, Tex.

HIGH FREQUENCY DIRECTION FINDING RESEARCH FOR SHIPBOARD USE: DIRECTION FINDER RADIO, SHIPBOARD SITING AND DESIGN, STUDY AND DEVELOPMENT.
Interim development rept. for 1 Sep-30 Nov 64, by Douglas Travers. 31 Dec 64, 18p
Contract NObsr89167, Proj. SF0010801, Task 9258
Unclassified report

Descriptors: (*Direction finding, Radio equipment), (*Radio receivers, Direction finding), (*High frequency, Direction finding), Loop antennas, Preamplifiers, Recording systems, Design, Calibration, Automatic, Oscillators, Varactor diodes, Tuning devices, Sensitivity, Shipborne.

Completion of repairs to the AN/SLR-10 spaced-loop antenna including satisfactory access door gaskets is reported. Initial tests on the AN/SLR-11 particularly the antennas and preamplifiers were performed. Equipment developed a number of years ago for azimuth curve plotting was extensively modified in order to replace an obsolete X-Y recorder and to reduce the size and weight of the equipment. The final experimental work toward the selection of a crossed spaced loop direction finding geometry is under way. Mechanical design of the model to be shipboard tested was started. Electronic tuning will be used in the upper frequency range from 2 to 6 mcs, and a self-calibration feature will be included to insure balance of the tuning circuits. The need for more information on required bearing sensitivity is mentioned. Lacking such information, new calculations are under way to set recommended sensitivity requirements for future designs especially in the lower HF range.

20. Nuclear Physics and Nuclear Chemistry

AD-610 004 Div. 20
OTS Prices: HC $4.00/MF $0.75

Air Force Weapons Lab., Kirtland AFB, New Mex.
A LEAST-SQUARES METHOD FOR THE ANALYSIS OF PROTON-PROTON SCATTERING DATA,
by David J. Knecht. Nov 64, 104p
WL TDR64 78

Unclassified report

Descriptors: (*Proton scattering, Least squares method), (*Least squares method, Proton scattering), (*Protons, Differential cross section), Elementary particles, Nuclear particles, Scattering, Energy, Polarization, Proton cross sections, Elastic scattering, Programming (Computers), Programming languages.

A detailed method is developed for the analysis of low-energy proton-proton scattering experiments. Convenient formulas for the differential scattering cross section and for the polarization are derived from the scattering amplitudes, and a completely analytic least-squares method is derived for fitting the theoretical expression to the experimental data. Contributions to the cross section from scattering in the S, P, and D states are included; contributions from tensor and spin-orbit forces are included in addition to those from central forces. The effects of vacuum polarization, of scattering in states of higher angular momentum, and of coupling between states of same J but different L are not computed by inclusion in the scattering amplitudes, but provision has been made to include these effects when calculated separately. The treatment is relativistically correct, but does not include dynamic relativistic effects which are negligible at low energy. Two Fortran-language computer programs are presented; the first makes the least-squares analysis to derive phase shifts from the experimental scattering data, while the second evaluates the theoretical expressions for the cross section and polarization for given values of the phase shifts. The estimation of uncertainties in the derived phase shifts is discussed in some detail. (Author)

AD-610 005 Div. 20, 22
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
OPERATION JANGLE: BASE SURGE ANALYSIS FOR NUCLEAR TESTS.
Facsimile rept.,
by George A. Young and Mary L. Milligan.
5 Jun 52, 17p
Proj. 1 9b
WT 390

Unclassified report

Declassified 25 Feb 60.

Descriptors: (*Nuclear explosions, Underground explosions), (*Underground explosions, Nuclear explosions), TNT, Explosions effects, Scale, Mathematical analysis.

Base surge and related surface phenomena produced by underground TNT explosions at depths scaled to the JANGLE underground shot are described. Empirical formulas showing the effect of charge weight on column and jet are listed and a method of scaling base surge flow for various charge weights and depths is presented. The cloud phenomena formed by the JANGLE surface shot are described briefly and compared with TNT results. Measurements of the base surge, column, jet, and smoke crown produced by the JANGLE underground shot are presented. The data indicate that column size can be predicted on the basis of TNT measurements but that overall cloud heights do not scale because of the thermal energy of the fireball. Froude scaling of the JANGLE base surge data shows a slower rate of growth and a smaller extent than the surges formed by scaled TNT explosions. A method is presented for predicting the rate of growth and maximum extent of base surges formed by atomic weapons with different energies than the JANGLE one kiloton bomb, but scaled to the same depth. (Author)

AD-610 054 Div. 20, 22
OTS Prices: HC $1.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
NUCLEAR WEAPONS EFFECTS: COMPREHENSIVE REPORT.
Rept. no. 2, 1955-Aug 64.
14 Jan 65, 24p ATD-P-65-1
TT 65 60769

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Nuclear explosion damage, Reviews), Explosion effects, Shock waves, Propagation, Metals, Compressive properties, Meteorites, USSR.

The report consists of three sections. The first section deals briefly with the structure and parameters of strong shock waves in solids and in gases. The second section presents a study of the propagation of strong shock waves in compressible media, collisions of such waves at high velocities, and the explosions associated with collisions at such velocities. The last section, entitled Meteorite Analogy, consists of material believed to be of significance in that it reflects Soviet interest in the study of meteorites as a means of simulating the effects of high-power explosions, especially nuclear explosions. The last section also covers one particular case of meteoritic collision, namely the explosion of the Tunguska meteorite/comet of 1908.

AD-610 055 Div. 20
OTS Prices: HC $1.00/MF $0.50

High Energy Physics Lab., Stanford Univ., Calif.
QUASI-FREE ELECTRON-PROTON SCATTERING IN H3 AND He3,
by Arne Johansson. 1964, 23p HEPL-326
Contract Nonr22567

Unclassified report

Research supported in part by the Air Force Office of Scientific Research, the Atomic Energy Commission, and the National Science Foundation.

Descriptors: (*Proton scattering, Electron bombardment), (*Electron bombardment, Proton scattering), (*Nuclear scattering, Electrons), Proton cross sections, Nuclear cross sections, Hydrogen, Helium, N-body problem, Scattering, Bremsstrahlung, Nuclear reactions, Linear accelerators, Coincidence counting, Charged particles, Particle accelerator targets, Proton reactions, Elastic scattering, Quantum mechanics.

Measurements have been made of the cross sections of

coincidences between scattered electrons and ejected protons, when targets of H3 and He3 are bombarded with 550 MeV electrons. The variation of the cross-section with proton angle and proton energy has been studied for fixed electron angle and energy. The results are compared with theoretical calculations based on different three-body nuclear wave functions. (Author)

AD-610 065 Div. 20
OTS Prices: HC $4.00/MF $0.75

Nevis Labs., Columbia Univ., Irvington-on-Hudson, N. Y.
THE BRANCHING RATIO FOR PION BETA DECAY.
Doctor's thesis,
by David Bartlett. Nov 64, 110p Nevis 127, CU-233
Contract Nonr26672

Unclassified report

Descriptors: (*Pions, Bata decay), (*Bata decay, Pions), Decay schemes, Muons, Nuclear reactions, Cyclotrons, Monitors, Gamma rays, Matrix algebra, Quantum mechanics, Electrons, Scattering, Vector analysis, Nuclear electric moments.

The conserved vector current theory predicts that the branching ratio for the decay of a charged pion into a neutral pion is (1.05±0.02)x10 to the -8th power, if the coupling constant is derived from muon decay, or (1.00±0.02)x10 to the -8th power, if the coupling constant is derived from nuclear beta decay. Using spark chambers to distinguish the nearly anticollinear gamma rays from pi(+) beta decay from a background of other gamma rays, we have found 36 events and have measured the branching ratio to be (0.97±0.20)x10 to the -8th power, in agreement with the theoretical prediction and previous measurements. The method of background subtraction (approximately 10%) depends only on knowing that the background is isotropic for gamma rays having opening angles between 160 degrees and 180 degrees. (Author)

AD-610 076 Div. 20, 25
OTS Prices: HC $3.00/MF $0.75

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
A STUDY OF THE REACTION p+p YIELDS d+ POSITIVE PION FROM 1 TO 2.8 BEV.
Technical rept. no. 18,
by Richard M. Heinz. Oct 64, 79p ORA-03106-18-T
Contract Nonr122423, Proj. 03106

Unclassified report

Doctoral thesis.

Descriptors: (*Proton reactions, Nuclear cross sections), (*Proton cross sections, Measurement), Deuterons, Pions, Nucleons, Mathematical models, Quantum statistics, Proton beams, Scattering, Scintillation counters, Particle accelerator targets.

The purpose of the investigation was to perform an experimental and theoretical study of the reaction p+p yields d+positive pion in the BeV region. The differential and total cross sections for this reaction have been measured with scintillation counters for incident proton kinetic energies of 1.0, 1.3, 1.5, 1.7, 2.0, 2.5, and 2.8 BeV, using the external proton beam of the Cosmotron of Brookhaven National Laboratory. Values of the differential cross section are given for barycentric deuteron angles (theta), for O>cos(theta)>-.97 in small intervals of cos(theta). A theoretical calculation is made using the one-nucleon exchange peripheral model, and the data are compared with this and with the one-pion exchange model and the statistical model.

AD-610 112 Div. 20
OTS Prices: HC $5.00/MF $1.00

Naval Ordnance Lab., White Oak, Md.
RESPONSE OF ENRICO FERMI REACTOR TO TNT SIMULATED NUCLEAR ACCIDENTS,
by W. R. Wise, Jr., J. F. Proctor, and L. P. Walker.
13 Nov 64, 171p NOL-TR-62-207
Task 285

Unclassified report

Descriptors: (*Reactor safety systems, Breeder reactors), (*Nuclear power plants, Safety), (*Breeder reactors, Reactor accidents), Reactor hazards, Accidents, Simulation, TNT, Nuclear explosion damage, Confinement, Containment, Reactor shielding calculations, Nuclear engineering.

The MHA (maximum hypothetical nuclear accident) for the Fermi reactor has been postulated for the purpose of this report not to exceed in violence the detonation of 1000 pounds of TNT at the core location. This report is addressed to predicting the structural response of Fermi to the MHA, particularly the possible jump of the shield plug. An extensive experimental program was conducted in which scaled charges of explosives (some cased in molten sodium) were detonated in idealized models of the Fermi reactor. The results of this experimental program together with available theory indicate that the accident would be contained wit in the reactor shielding complex, but that the 143-ton sh ld plug, if unimpeded, might be propelled as high as 10 ' feet and through the roof of the containment building. I. response to the findings of this extensive study, the Fermi reactor will be equipped with an arrester that will prevent a hazardous plug jump in the unlikely event of a nuclear accident. (Author)

AD-610 192 Div. 20, 24
OTS Prices: HC $2.00/MF $0.50

Carnegie Inst. of Tech., Pittsburgh. Graduate School of Industrial Administration.
COINCIDENCE COUNTING AND RENEWAL RUNS,
by D. P. Gaver, Jr. Jun 64, 26p ONR-RM-124
Contract Nonr27TO24

Unclassified report

Descriptors: (*Coincidence counting, Statistical processes), (*Statistical processes, Coincidence counting), Mathematical models, Stochastic processes, Integral transforms, Photons, Time, Photographic grain, Photographic chemicals.

21. Nuclear Propulsion

No Entries

22. Ordnance

AD-609 896 Div. 22, 17, 26
OTS Prices: HC $3.00/MF $0.75

Watertown Arsenal Labs., Mass.
URANIUM ALLOYS FOR CRITICAL ORDNANCE COMPONENTS.
Monograph Series.
23 Oct 61, 97p
WAL MS19

Unclassified report

Specification Coordination Meeting on Uranium Materials for Davy Crockett and Other Ordnance Programs held at Watertown Arsenal, Mass., 7 Jun 60.

Descriptors: (*Uranium alloys, Ordnance), (*Ordnance, Uranium alloys), (*Projectiles, Uranium alloys), Ammunition components, Armor, Tensile properties, Extrusions, Ductility, Toughness, Corrosion, Spotting rounds, Machining, Melting, Casting, Heat treatment, Molybdenum alloys, Titanium alloys, Steel, Forging, Material forming, Mechanical properties, Specifications, Density, Radiation hazards, Health physics, Impurities, Microstructure, Processing, Safety.

Contents: 'Ammunition requirements' - M. Bornstein; 'Uranium alloy bar for XM101 projectile' - J. Piskoraski; 'Uranium alloys for ordnance components' - J. Misencik; 'Uranium alloy processing' - E. Kinas; 'Surface characteristics' - M. Jacobson; Discussion and Changes of Proposed Specification - J. Coulter; Specification MIL-U-46045(Ord) 'Uranium alloy, wrought, bars, billets, and tubular shapes' (as revised); Control and accountability of S. S. Material; Health physics study during firing of uranium XM101 projectile.

AD-609 968 Div. 22, 2
OTS Prices: HC $3.00/MF $0.75

Naval Weapons Lab., Dahlren, Va.
RECENT TRENDS IN METEOROLOGICAL LITERATURE AND THEIR RELATION TO NAVAL WEAPONS SYSTEMS.
Technical memo.,
by Robert M. Fenn and Dayton G. Vincent. Dec 64, 89p
Projs. 36, FR103 2101R110101
NWL K61 64

Unclassified report

Descriptors: (*Meteorology, Ballistics), (*Ballistics, Meteorology), (*Weapon systems, Meteorology), (*Bibliographies, Meteorology), Ordnance, Naval equipment, Meteorological parameters, Oceanology, Reviews, Reports, Naval research.

This report, based upon a general survey of meteorological literature published during the ten years 1954 - 1964, describes briefly some of the changes which have occurred in the science of meteorology concurrently with, and in some cases, as a direct result of, new developments in naval weapons. The influence of new concepts in military weapons systems is shown by the rapid increase in the number of publications related to meteorology and its effect on weapons or, as defined here, 'ballistic meteorology.' An example of the increasing importance of meteorology in the design, testing and operational use of naval weapons is given in the section on 'Meteorological Support for POLARIS.' The bibliography, included as an appendix, contains over 700 titles on ballistic and general meteorology. (Author)

AD-610 050 Div. 22, 25
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
EFFECT OF SOME STRENGTH CHARACTERISTICS OF TARGET MATERIALS ON THE DEPTH OF PENETRATION OF SHAPED CHARGE JETS.
by Wiktor Babul. 27 Oct 64, 37p
RSIC 318; TT 65 60766

Unclassified report

Trans. of Instytut Mechaniki Precyzyjnej. Prace (Poland) 1961, v. 9, no. 34, p. 11-24.

Descriptors: (*Shaped charge jets, Penetration), Iron, Steel, Explosion effects, Models (Simulations), Geometric forms, Tensile properties, Density, Hardness, Deformation, Projectiles, Cavity liners, Poland.

Topics include: present state of the problem; study of the direction of permanent deformation; comparison of sample weights before and after penetration and metallographic studies of samples of iron and alloy steel; discussion of the model of penetration; analysis of the results; study of the influence of the geometry of samples, their tensile strength, density and scratch hardness.

AD-610 207 Div. 22, 26
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
ELECTROPLATING EXPLOSIVE DEVICES,
by Charles B. Root, James N. Ayres, and E. Eugene Kilmer. 1 Dec 64, 42p NOL-TR64 131
Task 321

Unclassified report

Descriptors: (*Electroplating, Explosive materials), (*Explosive materials, Electroplating), Detonators, Charges (Explosive), Shaped charges, Lead, Silver, Underwater, Copper, RDX, PETN, Seals (Stoppers), Detonating cord, Hermetic seals, Thickness, Containers.

Techniques for electroplating explosive items are described. Electroplating was used to encase mild detonating fuse terminating detonators, and small pressed charges, both flat-ended and shaped. Conventional lead-sheathed flexible linear shaped charge showed improved performance when plated with a thin sheath of silver. Underwater charges were sealed and confined by electroplating with copper. Fabrication and testing data for the above items plus other suggested applications are given. (Author)

23. Personnel and Training

AD-609 924 Div. 23
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IN THE DETACHMENT OF ASTRONAUTS,
by P. S. Denisyuk. 4 Dec 64, 21p
FTD TT64 398; TT 65 60704

Unclassified report

Unedited rough draft trans. from Sovetskaya Kirgiziya (USSR) 1963, no. 182, 6 Aug, p. 4; no. 183, 7 Aug, p. 4; no. 184, 8 Aug, p. 4; no. 185, 9 Aug, p. 4.

Descriptors: (*Astronauts, Training), (*Training, Space flight), Exercise, Vestibular apparatus, Physical fitness, Space medicine, USSR.

Notes of one of the trainers involved in the physical conditioning of the Soviet astronauts.

AD-610 027 Div. 23, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
DECENTRALIZED MANPOWER ALLOCATION BY SHADOW PRICING.
Professional paper,
by William Karush. 27 Oct 64, 13p SP-1851

Unclassified report

Descriptors: (*Personnel management, Research program administration), (*Research program administration, Personnel management), Mathematical models, Manpower studies, Economics, Mobilization, Numerical analysis, Partial differential equations.

A mathematical model is described for the optimal allocation of scientific and engineering manpower among several research and development projects. It is based upon the concept of shadow prices and is advocated as an approach which provides an acceptable balance between centralized and decentralized control. The model takes into account, for each project, not only the cost of varying manpower, but also the cost of changing the level from one period to the next. (Author)

AD-610 045 Div. 23, 18, 30
OTS Prices: HC $4.00/MF $1.00

American Institutes for Research, Pittsburgh, Pa.
DEVELOPMENT AND EVALUATION OF A SELF-INSTRUCTIONAL COURSE IN THE OPERATIONAL TRAINING CAPABILITY QUERY LANGUAGE FOR SYSTEM 473L, U. S. AIR FORCE HEADQUARTERS.
Interim rept.,
by Doris J. Clapp, David P. Yens, Harris H. Shettel, and Sylvia R. Mayer. Dec 64, 127p
Contract AF19 628 2935, Proj. 7682, Task 768204
ESD TDR64 662

Unclassified report

Descriptors: (*Training devices, Programming languages), (*Programming languages, Training devices), (*Information retrieval, Command and control systems), (*Command and control systems, Air Force), Communication theory, Teaching machines, Air force operations, Computers, Data transmission systems, Data processing systems.

This report summarizes the development and evaluation of a self-instructional course teaching the man-computer Query Language of System 473L for the Operational Training Capability phase (OTC). First, the report describes the rationale for the two-phase approach that was implemented in this course, phase one consisting of a linear programed text and phase two consisting of an adaptive, computer-directed instructional program presented by the 473L System computer. Next, it describes the development of the programed text, the text itself, and the effectiveness of the text materials based on tryout data. Finally, development of the computer-directed materials is covered, with emphasis on the training strategy employed, the operational specifications, and the flow chart and procedural flow diagram. (Author)

AD-610 056 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
ATTITUDES AND CAREER INTENTIONS OF OFFICER TRAINING SCHOOL GRADUATES,
by Francis D. Harding and Kenneth K. L. Wong.
Oct 64, 23p PRL TR-64-26
Proj. 6755, Task 675501

Unclassified report

Descriptors: (*Air force training, Officer personnel), (*Officer personnel, Attitudes), (*Air force personnel, Psychometrics), Motivation, Education.

Information about the attitudes, job satisfactions, and career intentions of graduates of the Air Force Officer Training School (OTS) was obtained after the respondents had completed about 18 months of commissioned service. The results were compared with findings obtained at the time of graduation from OTS. Career intentions crystallized during the intervening months as the undecided made up their minds. Consistency of opinion was shown by the fact that about two-thirds of those who had expressed an opinion at time of graduation still retained the same opinion. Information obtained at time of graduation was still predictive of career intent, as was educational and assignment information. An attitude measure, the Importance-Possibility Scale, showed that a sense of accomplishment and competent supervision were rated among the most important of the 22 job attributes. Significant differences in distribution of ratings were found between the career-minded and noncareer-minded groups. (Author)

AD-610 093 Div. 23
OTS Prices: HC $2.00/MF $0.50

ENTELEK, Inc., Newburyport, Mass.
PROGRAMMED INSTRUCTION IN RETAIL SALES.
Final rept. for Sep 61-Sep 62,
by Albert E. Hickey and William J. Laidlaw. 1 Oct 62, 41p
Contract Nonr363000

Unclassified report

Descriptors: (*Naval personnel, Learning), (*Learning, Psychometrics), Education, Effectiveness, Instructors, Management engineering, Commerce, Achievement tests, Retention, Attitudes, Time.

The report describes the first full-course evaluation of programmed instruction in the Navy. Programmed individual instruction was substituted for part of the lecture and discussion, and for all of the homework assignments in an 11-week course in Retail Sales and Ship's Store Management at the U. S. Navy Supply Corps

School. Seventy-eight officer students followed the new procedure, 52 followed the usual procedure. The program group saved 56 per cent of the usual homework time, or 17 per cent of the usual over-all study time, and the instructors of the program group saved 54 per cent of the usual lecture hours. Achievement and retention in the program group were equal to that in the control group. The program group showed more homogeneous performance with auditing and problem-solving procedures. A survey of student attitudes disclosed that a majority of the program students felt the program was most effective in teaching auditing and other problem-solving procedures and were agreeable to receiving programmed instruction in the future. (Author)

AD-610 129 Div. 23, 18, 28
OTS Prices: HC $3.00/MF $0.75

Operations Research, Inc., Silver Spring, Md.
THE BUREAU OF NAVAL PERSONNEL NEW DEVELOPMENTS PERSONNEL PLANNING INFORMATION DOCUMENTATION PROCEDURES AND FORMATS,
by V. Owen Wayman and Daniel B. Jones. Nov 64, 63p ORI-TR-285, ND-65-10
Contract Nonr394900

Unclassified report

Descriptors: (*Naval personnel, Manpower studies), (*Manpower studies, Documentation), (*Personnel management, Naval personnel), (*Job analysis, Weapon systems), Naval training, Systems engineering, Human engineering, Maintenance, Maintenance personnel, Military requirements, Data processing systems.

Bureau of Naval Personnel New Developments Personnel Planning Information Documentation Procedures and Formats are presented. The report is specifically designed to assist New Developments analysts and contractors in documenting Personnel Planning Information (PPI) as required for the Bureau of Naval Personnel Personnel Research Reports. These exhaustive Personnel Research Reports provide the basic data source for planned requirements inputs to the CAPRI manpower management system, the preparation of inputs to Technical Development Plans (TDP's), Training Plan Conferences (TPC's), and other research studies, and comprise a record of personnel research conducted on new Naval weapon and support systems. This report presents detailed procedures for development of the PPI data, specific examples of formatted information, and an outline of how the PPI data are structured in the Personnel Research Report. Subsequent Bureau of Naval Personnel Operating Instructions will provide specific guidance for utilizing the PPI data to meet TDP, TPC, etc., requirements.

AD-610 209 Div. 23, 18
OTS Prices: HC $7.00/MF $1.75

Department of Defense, Washington, D. C.
STUDY OF MANAGEMENT EDUCATION AND TRAINING WITHIN THE DEPARTMENT OF DEFENSE. PART IV. SPECIAL LOGISTICS SCHOOL TASK GROUP REPORT.
18 Jan 63, 316p

Unclassified report

Descriptors: (*Training, Logistics), (*Logistics, Education), Management engineering, Officer personnel, Department of Defense, Instructors, Management planning.

The study considers the present school systems of the services, the output of officers qualified as joint logisticians, the requirement of Department of Defense agencies for such officers and their training, attempts to identify existing educational and training gaps between the need and the capability to meet it, and explores appropriate measures to meet such needs.

AD-610 214 Div. 23, 30, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ROLE OF THE COMPUTER IN SECONDARY SCHOOLS,
by F. J. Gruenberger. Jan 65, 5p P-3044

Unclassified report

Presented at the Annual Convention of the National Council of Teachers of Mathematics, Denver, Colo., 28 - 30 Jan. 65.

Descriptors: (*Computers, Education), (*Education, Computers), Training, Computer personnel, Students, Theory.

The desirability of high school computing courses is discussed. Reasons are advanced to justify having computers in high schools.

AD-610 272 Div. 23, 30, 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FROM THE ACADEMY OF SCIENCES OF THE UNION OF SOVIET SOCIALIST REPUBLICS,
by M. V. Keldysh and E. K. Fedorov. 16 Dec 64, 22p FTD-TT-64-411
TT 65 60978

Unclassified report

Unedited rough draft trans. of Izvestiya (USSR) 1962, no. 139, 13 Jun, p. 4-5.

Descriptors: (*Scientific organizations, USSR), (*Scientific personnel, USSR).

Announcement is made of the names of candidates for the office of academician within the USSR Academy of Sciences. These are presented on the basis of the April 29, 1962, notification, with the names of organizations and persons proposing the candidates. The candidates are for appointment within the following departments: Department of Chemical Sciences; Department of Geological-Geographical Sciences; Department of Biological Sciences; Department of Technical Sciences; Department of Historical Sciences; and the Department of Economic, Philosophical, and Legal Sciences.

AD-610 275 Div. 23, 12, 18, 22
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DISPATCHER OF ROCKET FIRE,
by S. Vladimirov. 8 Dec 64, 8p FTD-TT-64-1209
TT 65 60981

Unclassified report

Unedited rough draft trans. from Krasnaya Zvezda (USSR) 1964, no. 135, Jun, p. 3.

Descriptors: (*Military personnel, USSR), (*Fire

control systems, Military personnel), Personnel, Weapon systems, Military requirements, Training.

A general discussion of the personal qualities and the military training of Russian fire control officers.

24. Photography and Other Reproduction Processes

AD-609 945 Div. 24, 18
OTS Prices: HC $5.00/MF $1.00

Data Corp., Dayton, Ohio.
IMAGE AMPLIFIER LABORATORY EVALUATION PROGRAM.
Rept. for Apr 62 - Oct 64,
by Maurice B. Aufderheide and Neal Dougherty.
19 Oct 64, 153p FR-64-2
Contract AF33 657 8611, Proj. 6220, Task 622005
AL TDR64 211

Unclassified report

Descriptors: (*Photographic images, Amplifiers), (*Aerial reconnaissance, Night photography), (*Night photography, Aerial reconnaissance), (*Aerial cameras, Photographic images), Camera lenses, Camera components and accessories, Photographic films, Photomultipliers, Photocathodes, Photoelectrons, Phosphorescent materials, Aerial photography, Feedback, Illumination, Distortion, Resolution, Bandwidth, Mathematical analysis, Programming (Computers), Performance (Engineering), Test methods, Photographic reconnaissance.

This report incorporates the results of the Theoretical and Laboratory Evaluation of three non-scanning Image Amplifier Camera Systems. Initially the test criteria for evaluating a non-scanning amplifier camera are discussed. The test techniques employed to determine the defining parameter also are presented. The later portion of the report illustrates the employment of these techniques in the evaluation of the three Image Amplifier Camera Systems. (Author)

AD-609 950 Div. 24, 14, 18
OTS Prices: HC $4.00/MF $1.00

Horizons, Inc., Cleveland, Ohio.
DEVELOPMENT OF CONTINUOUS-TONE FREE-RADICAL REPRODUCTION MATERIALS.
Final rept. for 18 Apr 63-7 Jun 64,
by R. H. Sprague and M. Roscow. Nov 64, 125p
Contract AF33 657 11647
SEG TR64 64

Unclassified report

Continuation of Contract AF33 647 8160.

Descriptors: (*Photographic film, Preparation), (*Reconnaissance film, Coatings), Photographic tone, Photographic images, Photographic filters, Free radicals, Photographic processing equipment, Density, Tests, Graphics.

The effort was directed toward the production of machine-coated film of free-radical photographic materials suitable for the reproduction of high-acuity continuous-tone reconnaissance negatives through several generations. Satisfactory machine-coatings, approximately 9-1/2 inches wide in 1000-foot lengths, were made of the DPA blue-image formulation and of the SQ/D-177 black-image photosystem. With these films, fourth-generation prints (with near-unity contrast and gamma) were achieved from aerial negatives of high, medium, or low contrast. Gamma-tonal response was controlled by variation of the spectral quality of the exposing light and exposure time. (Author)

AD-610 271 Div. 24
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INFRARED TELEVISION CAMERA,
8 Dec 64, 3p FTD-TT-64-786
TT 65 60977

Unclassified report

Unedited rough draft trans. of Nauka i Tekhnika (Latvian SSR) 1963, no. 12, p. 39.

Descriptors: (*Television cameras, Infrared equipment), Infrared radiation, Illumination, East Germany, USSR.

25. Physics

AD-609 893 Div. 25, 7, 20, 21
OTS Prices: HC $4.00/MF $1.00

Atomics International, Canoga Park, Calif.
BASIC RESEARCH IN THERMIONIC ENERGY CONVERSION.
Annual technical summary rept. no. 4, 1 Nov 63-31 Oct 64,
by C. Warner and L. K. Hansen. Dec 64, 116p
AI-64-271
Contract Nonr 9119200

Unclassified report

See also AD-430 354.

Descriptors: (*Thermionic converters, Nuclear power plants), (*Nuclear power plants, Thermionic converters), Thermionic emission, Boundary layer, Diodes (Electron tubes), Cesium, Molybdenum, Plasma sheath, Ionization, Transport properties, Relaxation time, Statistical mechanics, Electrons, Theory, Probability.

This report presents the results of the past year's work in a continuing program to investigate basic processes in thermionic energy conversion important to a thermionic nuclear power plant for naval applications. The previous work was reported in AI-64-20, 'Third Annual Technical Summary Report for Basic Research in Thermionic Energy Conversion.' The subject discussed in the present report are: ignited mode and ion-rich unignited mode volt-ampere characteristics; boundary conditions and ion generation mechanisms for the ignited mode; retarding field operation of thermionic diodes; ion production in the collector glow mode; and plasma boundary conditions using a generalized Yvon's analysis. (Author)

AD-609 902 Div. 25
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
CALCULATED SPECTRA RESOLUTION OF PERKIN-ELMER PRISM AND GRATING MONOCHROMATORS.
Interim rept.,
by E. D. Palik and J. R. Stevenson. 8 Dec 64, 55p
Proj. RR008 03 46 5666
NRL 6177

Unclassified report

Descriptors: (*Spectrum analyzers, Infrared spectroscopy), (*Resolution, Spectra (Infrared)), (*Spectra (Infrared), Spectrum analyzers), Prisms (Optics), Diffraction gratings, Diffraction, Monochromatic light, Infrared optical systems, Instrumentation, Equations, Halogen compounds, Alkali metal compounds, Calcium compounds.

A simple derivation of the spectral resolution of the standard Perkin-Elmer prism and grating monochromators (Models 12-C and 12-G) has been carried out. Some attention is given to discussion of the variation of the diffraction pattern width at the exit slit as a function of the physical width of the entrance slit. Brief mention of power considerations is also made. The resulting formulas have been used to calculate spectral slit width curves for eight different prisms and twenty-six gratings. The spectral slit width in 1/cm is plotted as a function of the frequency in 1/cm and wavelength in microns. These detailed graphs allow a determination of spectral slit width from quick inspection. (Author)

AD-609 910 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

Dartmouth Coll., Hanover, N. H.
ON COOLED ANODES IN CONTACT WITH LAMINAR ARC-HEATED FLOWS.
Interim technical rept. for 1 Feb 62-1 Aug 63,
by Harris B. McKee, Robert C. Dean, Jr. and Agnar Pytte. Oct 64, 82p
Contract AF33 657 8179, Proj. 7063, Task 7063 03
ARL 64 178

Unclassified report

Descriptors: (*Plasma medium, Anodes), (*Anodes, Plasma medium), (*Laminar flows, Plasma medium), (*Electric arcs, Laminar flows), Laminar boundary layer, Boundary layer, Fluid flow, Electric currents, Electrical conductance, Plasma sheath, Plasma physics, Voltage, Cooling, Cathodes, Heating, Electrodes.

This paper is concerned with the physics and operating characteristics of cooled anodes in contact with an arc-heated laminar plasma flow in a constant area duct. Various modes of anode behavior are identified and described. Some influences of gas type, flow rate, arc current, anode material and geometry are demonstrated. A theory is developed to explain the low-current mode of the anode characteristics. It is shown that the local current density on the anode surface is related approximately to the surface's local bias relative to its electrically floating voltage. Anode current distribution data is presented; the distribution is shown to be unstable above a transition bias voltage, with the current concentrating intensely on the edge of the anode toward the cathode. (Author)

AD-609 911 Div. 25
OTS Prices: HC $3.00/MF $0.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
POLARIZATION EFFECTS ON MAGNETIC RESONANCES IN FERROELECTRIC POTASSIUM TANTALATE.
Technical rept.,
by Stuart H. Wemple. 31 Dec 64, 87p RLE-425
Contracts DA36 039AMC03200E, DA36 039SC87376

Unclassified report

Research supported in part by the Joint Services Electronics Programs.

Descriptors: (*Paramagnetic resonance, Polarization), (*Ferroelectric crystals, Paramagnetic resonance), (*Tantalum compounds, Oxides), Electric fields, Hall effect, Single crystals, Transport properties, Semiconductors, Hamiltonian, Hyperfine structure, Chemical bonds, Iron, Manganese, Cobalt, Chromium, Ions, Potassium compounds, Absorption spectrum.

Electric field effects on electron paramagnetic resonances (EPR) associated with Fe(3+) impurity ions in the perovskite ferroelectric KTaO3 are presented and discussed. A large effect (D = 0.003/cm for E = 14 kv/cm) was predicted and observed at 4.2 degrees K. The EPR angular dependence data for the Fe(3+) ion in a cubic environment are interpreted in terms of appropriate spin Hamiltonian parameters. The result is alpha = (345±10) x 0.0001/cm and g = 1.99 ± 0.01. We also reported EPR spectra for Fe(3+) ions that have a neighboring oxygen vacancy, and also for Fe(5+), Mn, and Cr. Evidence for covalent bonding of magnetic impurities to the KTaO3 lattice is given. Optical absorption spectra associated with Fe, Mn, and Co impurities are also reported. A brief investigation was made of transport properties of slightly

reduced, electrically conducting (n-type) samples of KTaO3. There is a strong temperature-dependent Hall mobility (28 sq cm/volt sec at room temperature and at least 63,000 sq cm/volt sec at 4.2K). A method for growing fairly large (about 1 cu cm) and good quality single crystals of KTaO3 is described.

AD-609 923 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
IONIZATION OF SUPERSONIC STREAM OF MERCURY VAPOR BY A BEAM OF HYDROGEN IONS,
by A. D. Abramenkov, V. F. Rybalko, and Ya. M. Fogel'. 4 Dec 64, 15p
FTD TT64 626; TT 65 60703
Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Fizika (USSR) 1963, no. 5, p. 75-81.

Descriptors: (*Gas ionization, Ion beams), (*Ion beams, Gas ionization), (*Plasma physics, Ion beams), Ionization, Plasma medium, Mercury, Vapors, Hydrogen, Space charges, Gas discharges, Electrons, Charged particles, Test methods, Supersonic flow.

The possibility of obtaining multicharged ion beams from a plasma formed by the ionization of a supersonic stream of mercury vapor by a beam of hydrogen ions is investigated. It is shown that a beam current is limited by the space charge in the region between the ionization zone and the suction probe. (Author)

AD-609 942 Div. 25
OTS Prices: HC $2.00/MF $0.50

American Science and Engineering, Inc., Cambridge, Mass.
A CONJECTURE ABOUT THE STRUCTURE OF A MAGNETIC SHOCK WAVE IN A PLASMA.
Final rept. pt.3,
by Yvain M. Treve. 1 Jul 64, 41p ASE-654
Contract AF19 628 2388, Proj. 8647, Task 864701
AFCRL 64 594 P3
Unclassified report

Descriptors: (*Shock waves, Magnetic fields), (*Plasma physics, Shock waves), (*Mathematical models, Shock waves), Magnetohydrodynamics, Hydrogen, Gas ionization, Viscosity, Subsonic flow, Supersonic flow.

A model is considered for the structure of a plane, steady shock wave propagating in an inviscid plasma across a magnetic field normal to the direction of propagation. The model does not possess a solution for relatively small magnetic fields. Assuming that a continuous solution exists in this case when the effects of viscosity are taken into account, it is shown how the occurrence of a sub-shock can be conjectured when these effects become vanishingly small. (Author)

AD-609 956 Div. 25, 7, 9
OTS Prices: HC $5.00/MF $1.25

Michigan Univ., Ann Arbor. Aircraft Propulsion Lab.
THE BEHAVIOR OF DYNAMIC ELECTRIC ARCS.
Interim technical documentary rept. for 1 Oct 63 - 15 Jul 64,
by R. L. Phillips. Sep 64, 181p
Contract AF33 615 1326, Proj. 7065, Task 7065 01
ARL 64 150
Unclassified report

Descriptors: (*Electric arcs, Thermal properties), (*Plasma medium, Electric arcs), Partial differential equations, Boundary value problems, Heaters, Electrical conductance, Thermodynamics, Electric fields, Electric discharges, Alternating current, Nitrogen, Argon, Atmospheric entry, Simulation.

The thermal structure of an AC arc was studied both experimentally and analytically. In order to provide a reasonable description of the manner in which the dynamic arc behaves as a circuit element, it is first necessary to solve the partial-differential equation that describes the energy-transfer processes within the arc column. In the idealized situation, where the arc is characterized by strict cylindrical symmetry and the electrodes have little effect on the positive column, certain limiting closed-form solutions have been obtained from the appropriate boundary-value problem. In the general case, the problem has been solved on a digital computer. In all cases, a simplified relationship between the electrical conductivity and the plasma temperature was assumed. The theoretically derived waveforms for electric-field strength and current bear a close relationship to those found by experiment. The latter results were obtained from a cascade-tube arc such as that employed by Maecker for his DC work. The present device was excited by 60-cps AC power, and rms currents up to 30 A were employed. Nitrogen, and argon were the working gases. (Author)

AD-609 965 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A STUDY OF SURFACE PHENOMENA ON ORGANIC SOLIDS.
Quarterly progress rept. no. 2, 10 Sep-9 Dec 64,
by P. J. Reucroft, P. Chairge, and M. M. Labes.
11 Dec 64, 12p Q-B2227-2
Contract DA18 035AMC141A
Unclassified report

See also AD-607 028.

Descriptors: (*Organic materials, Surface properties), (*Ammonia, Adsorption), (*Krypton, Adsorption), Powders, Glass, Coatings, Silicone plastics, Thermodynamics, Crystals, Polycyclic compounds, Diffusion, Tracer studies.

The background adsorption of the volumetric system was carefully evaluated as a preliminary to adsorption studies on organic solid powders. Background adsorption on the glass walls was reduced to a low value by coating the surface with silicone fluid. The adsorption of krypton and ammonia under these conditions was then determined in order to establish correction factors. (Author).
An appendix summarizing studies on diffusion in anthracene crystals is included.

AD-609 971 Div. 25
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
PARAMAGNETIC RELAXATION IN CRYSTALS.
Final rept. for 1 Nov 63-31 Oct 64,
by John G. Castle, Jr., Donald W. Feldman, and Joseph Murphy. 31 Oct 64, 12p
Contract AF19 628 3838, Proj. 4608, Task 46801
AFCRL 64 924
Unclassified report

Descriptors: (*Crystals, Paramagnetic resonance), (*Paramagnetic resonance, Relaxation time), Crystal lattice defects, Quartz, Glass, Strain (Mechanics), Resonance, Temperature, Nuclear spins, Hydrogen, Calcium compounds, Fluorides, Color centers, Phonons, Oxygen, Theory.

Studies of paramagnetic relaxation in crystals were made. The results include: 1) More accurate relaxation data characteristic of the vacancy-type defects in crystalline quartz. 2) Relaxation data characteristic of similar defect centers in Ge02 Glass. 3) Interpretations of these data in terms of a large local strain at frequencies characteristic of mechanical resonance modes localized around the defect. 4) Discovery of a temperature dependence determined by the high frequency local mode associated with atomic hydrogen trapped in calcium fluoride. 5) Discussion of relaxation theory by means of relaxation diagrams, analogous to those introduced in quantum electrodynamics by R. P. Feynman. (Author)

AD-609 998 Div. 25, 30
OTS Prices: HC $6.00/MF $1.25

Maryland Univ., College Park.
MEASUREMENT OF THE OSCILLATOR STRENGTH OF THE NEUTRAL HELIUM RESONANCE LINE.
Scientific rept. no. 3 (Final) Aug 59-Oct 64,
by Reimer P. H. Lincke. 24 Nov 64, 209p
Contracts AF19 628 269, NONR59510, Proj. 8647, Task 864702
AFCRL 64 960
Unclassified report

Doctoral thesis.

Descriptors: (*Ultraviolet spectroscopy, Helium), (*Helium, Ultraviolet spectroscopy), Ultraviolet radiation, Theory, Resonance, Vacuum, Vacuum pumps, Plasma medium, Electron density, Hydrogen, Light, Blackbody radiation, Oscillators, Photomultipliers, Photoelectric effect, Narrowband, Spectroscopy.

The f-value of the lambda 584 HeI line was determined from the saturated emission profile using an electromagnetic T-tube filled with a hydrogen-helium mixture as light source. Since the central saturation levels of this line and the higher series members could be connected by a smooth curve which (with a small correction for detector response) agreed with the relative blackbody intensity, these levels were identified with the blackbody corresponding to the measured plasma temperature, and this furnished the required calibration standard. The resulting value f = 0.27 ± 0.07 is consistent with most recent theoretical values. (Author)

AD-610 006 Div. 25
OTS Prices: HC $2.00/MF $0.50

Paris Univ. (France).
X-RAY SCATTERING BY POINT-DEFECTS.
Final technical rept.,
by A. M. Levelut and A. Guinier. 1962, 28p
Grant AF EOAR62 51
AFOSR 65 0060
Unclassified report

Descriptors: (*Crystal lattice defects, X-ray diffraction analysis), (*X-ray diffraction analysis, Instrumentation), Scattering, Solid solutions, Aluminum alloys, Gallium alloys, Copper alloys, Zinc alloys, Lithium compounds, Fluorides, Silicon, France.

A device is described which was designed to detect the diffuse X-ray scattering caused by point defects in a crystal. Tests concerning the sensitivity of the apparatus are summarized, as are results of its application to problems involving the degree of order in diffuse solid solutions and the effects of irradiation on crystals.

AD-610 007 Div. 25, 9, 15
OTS Prices: HC $3.00/MF $0.75

Columbia Univ., New York. Dept of Civil Engineering and Engineering Mechanics.
AXISYMMETRIC VIBRATIONS OF SUBMERGED SPHEROIDAL SHELLS.
Technical rept. no. 4,
by Sabih Hayek and Frank L. DiMaggio.
1964, 63p CU-1-64-ONR(67)-CE
Contract Nonr26667, Proj. 385 414
Unclassified report

Descriptors: (*Spheres, Vibration), (*Underwater objects, Acoustic properties), Elasticity, Incompressible flow, Perturbation theory, Steel, Structural shells, Boundary layer, Axially symmetric flow, Series, Differential equations, Mathematical analysis, Polynomials.

The differential equations governing the free axisymmetric extensional vibrations of an elastic prolate spheroidal shell submerged in an infinite acoustic medium are obtained in prolate spheroidal coordinates using Hamilton's principle. Solutions are obtained by a perturbation technique which converges well for shells of small eccentricity. Numerical results are presented for the fundamental mode, frequency and acoustic impedence of steel shells in water for ratios of major to minor axis up to 1.23 over a wide range of shell length to thickness ratios. (Author)

AD-610 012 Div. 25
OTS Prices: HC $1.00/MF $0.50

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 13,
by R. E. Halsted, D. T. F. Marple, and B. Segall.
31 Oct 64, 9p
Contract AF33 616 8264
Unclassified report

This rept. includes Appendix: Photoluminescence of Defect-Exciton Complexes in II-VI Compounds.
See also AD-601 674.

Descriptors: (*Semiconductors, Impurities), (*Cadmium alloys, Tellurium alloys), (*Luminescence, Impurities), (*Molecular spectroscopy, Semiconductors), Single crystals, Crystal lattices, Zinc compounds, Selenides, Sulfides, Emissivity, Fluorescence, Band spectrum.

During the period of this report two areas of research activity have been emphasized. Attempts to prepare CdTe samples with band-edge fluorescent emission spectra correlated with the identity of impurity additions have been successful. A theoretical study of the shape of the absorption edge has been continued. In addition, research performed under this contract has stimulated a theoretical study which has accounted for a discrepancy between theory and experiment on the temperature dependence of the band gap in CdTe. The results on E sub g(T) are significant for a number of other compounds where the existence of a similar problem is well established.

AD-610 014 Div. 25
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.

DISLOCATIONS IN SOLIDS,
Final rept.,
by R. Thomson. 20 Dec 64, 12p
Grant AF AFOSR62 179
AFOSR 65 0061

Unclassified report

Descriptors: (*Crystal lattice defects, Theory), (*Solids, Crystal lattice defects), (*Semiconductors, Crystal lattice defects), Light, Absorption, Crystals, Diffusion, Lithium compounds, Fluorides, Germanium, Color centers, Internal friction, Alkali metal compounds, Halides, Impurities, Green's function, Vibration, Relaxation time, Shock waves, Metals, Mathematical analysis, Ionization, Electric fields, Potassium compounds, Chlorides.

AD-610 015 Div. 25, 8, 13
OTS Prices: HC $3.00/MF $0.75

Army Electronics Labs., Fort Monmouth, N. J.
CURRENT STATUS AND FUTURE TRENDS OF CRYOGENIC COOLERS FOR ELECTRONIC APPLICATIONS,
Technical rept.,
by Charles A. Stochl and Edward R. Nolan. Jul 64, 57p
Proj. 1E6 41209D536, Task 1E6 41209D536 07,
ECOM 2524

Unclassified report

Descriptors: (*Cryogenics, Electronic equipment), (*Electronic equipment, Cryogenics), (*Cooling, Cryogenics), Military requirements, Army equipment, Infrared detectors, Masers, Lasers, Parametric amplifiers, Superconductors, Computers, Thermoelectricity, Solid state physics, Magnetic properties.

The U. S. Army has a number of current and planned electronic programs that require the application of a cryogenic temperature environment. This report, prepared as the result of a recent survey of these requirements, discusses the technical aspects of cryo-refrigeration, and analyzes the Army's cryo-cooler needs, the availability of hardware, and trends in cryo-cooler developments. Included is a list of recommended programs designed not only to upgrade present cryo-cooler equipment but also to make available suitable cryo-coolers concurrently with the future electronic developments of the Army. (Author)

AD-610 031 Div. 25, 7, 9
OTS Prices: HC $4.00/MF $1.00

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
EXPERIMENTAL AND ANALYTICAL STUDY OF THE FUNDAMENTAL INTERACTION AND ENERGY EXCHANGE PROCESSES BETWEEN ELECTRIC ARC DISCHARGES AND CROSS-FLOW FIELDS OF PREIONIZED GASES WITH AND WITHOUT THE PRESENCE OF TRANSVERSE MAGNETIC FIELDS,
Final technical rept. for 30 Jun 63-30 Jun 64,
by A. C. Malliaris. Dec 64, 116p
Contract AF33 657 11310, Proj. 7063, Task 706303
ARL 64 216

Unclassified report

Descriptors: (*Electric arcs, Plasma physics), (*Plasma medium, Electric arcs), Electric discharges, Gas ionization, Gas flow, Magnetic fields, Electrical properties, Electrodes, Heat transfer, Transport properties, Thermodynamics, Heaters, Nitrogen, Thermochemistry, Stagnation point.

The report presents results from an experimental and analytical study of an electrical discharge interacting with a transverse flow of pre-ionized gas in the presence of an applied magnetic field. The experimental work includes high speed photography and measurements of electrical characteristics, heat transfer to the electrodes, as well as radiation emitted by the discharge. A wide variety of data are presented in graphs and tables. The data are correlated in terms of an approximate theory which is developed. The comparison of the experiment with the theory is partially satisfactory. Some conclusions of practical interest are: the electrical discharge under consideration has arc-like characteristics. The column occupies a small fraction of the cross-sectional area in the flow. The fraction of the input power used for acceleration is small. The predominant mode of energy transport from the discharge is convection. Conduction and radiation are negligible. The input power increases in the presence of a magnetic field but the electrical conductivity is independent of the magnetic field up to 5000 gauss. (Author)

AD-610 032 Div. 25
OTS Prices: HC $2.00/MF $0.50

General Technology Corp., Elgin, Ill.
STRESS ANALYSIS OF CONICAL SHELLS WITH LINEARLY VARYING WALL THICKNESS,
Technical rept. no. 1-21,
by Huo-Hsi Pan. Sep 64, 44p
Contract DA11 022ORD2917

Unclassified report

Descriptors: (*Structural shells, Stresses), (*Conical bodies, Stresses), Mathematical analysis, Differential equations, Loading (Mechanics), Strain (Mechanics), Analysis of variance, Joints, Thickness, Deformation.

Contents: Differential equations, boundary conditions and junction conditions; Solutions to the differential equations.

AD-610 039 Div. 25
OTS Prices: HC $2.00/MF $0.50

Battelle Memorial Inst., Columbus, Ohio.
LOCAL YIELDING AND EXTENSION OF A CRACK UNDER PLANE STRESS,
Combined progress rept.,
by G. T. Hahn and A. R. Rosenfield. Dec 64, 27p
Contract NObs88348, Proj. SR164
SSC 165

Unclassified report

Rept. includes Fundamentals of Crack Propagation Resistance; Local Strain Measurement.

Descriptors: (*Fracture (Mechanics), Mathematical analysis), Stresses, Mathematical models, Strain (Mechanics), Toughness, Deformation, Elasticity, Steel.

The size of locally yielded regions, the stress distribution, and displacements attending a crack in tension under plane stress have been calculated by extending the work of Dugdale and others. Methods have been developed to take work hardening and unloading into account. The displacements and plastic-zone sizes measured in edge-slotted silicon steel coupons are found to be in agreement with calculations. Conditions under which plane stress or plane strain are dominant in these edge-slotted specimens have also been determined. Finally, Irwin's fracture-toughness parameter and the conditions for crack extension are formulated in terms of basic material parameters consistent with experiment. (Author)

AD-610 042 Div. 25, 4, 7
OTS Prices: HC $1.00/MF $0.50

Dartmouth Coll., Hanover, N. H. Dept. of Physics and Astronomy.
ELECTRICAL BEHAVIOR OF IONIC CRYSTALS.
Final summary rept.,
by Robert W. Christy. Dec 64, 5p
Contract Nonr389704, Proj. NR032 460

Unclassified report

Descriptors: (*Thermoelectricity, Crystals), (*Halides, Thermoelectricity), Silver compounds, Sodium compounds, Copper compounds, Thallium compounds, Chlorides, Bromides, Impurities, Electrical properties, Crystal lattice defects, Electrodes.

A summary is given of studies concerning thermoelectric power in crystals of AgCl, AgBr, NaCl, CuCl, and TlCl.

AD-610 060 Div. 25
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE PHYSICAL NECESSITY FOR GENERAL CONVARIANCE IN ELECTROMAGNETIC THEORY.
Special repts.,
by E. J. Post. Dec 64, 29p AFCRL 64-997, AFCRL SR16

Unclassified report

Descriptors: (*Electromagnetism, Mathematical analysis), Groups (Mathematics), Transformations (Mathematics), Partial differential equations, Relativity theory, Electromagnetic fields, Projective geometry, Topology.

This paper reviews the essentials of the principle of general covariance and emphasizes the points of contrast with the more restricted but more accepted forms of covariance such as Lorentz covariance. It is emphasized that the implementation of general covariance should aim at a maximized functional separation between the formulation of the physical laws and the description of the specific physical system or medium under consideration; uniqueness of the implementation is determined by choosing dependent variables that bring out the functional separation. The invariance group of the law should be a covering group of the symmetry group characterizing the system or medium to which the law is applied. The procedure, which removes existing paradoxes and inconsistencies, is illustrated by examples from electromagnetic theory. A discussion of general principles helps to establish unique procedures for the implementation of general covariance. (Author)

AD-610 064 Div. 25
OTS Prices: HC $2.00/MF $0.50

J. G. Engineering Research Associates, Baltimore, Md.
ELASTIC AND PLASTIC BEHAVIOR OF CYLINDRICAL SHELLS UNDER DYNAMIC LOADS BASED ON ENERGY CRITERIA.
Technical rept. no. 3,
by Joshua E. Greenspon. Feb 63, 26p
Contract DA36 034ORD3081
AD 298 063 superseded

Unclassified report

Descriptors: (*Cylindrical bodies, Structural shells), (*Structural shells, Cylindrical bodies), (*Loading (Mechanics), Structural shells), Elasticity, Plasticity, Energy, Deformation, Theory, Hardening, Shear stress, Stresses, Mathematical analysis, Integral equations.

A theory for the dynamic elasto-plastic deformations of thin shells is presented. The deformation is obtained by equating the energy input to the energy absorbed by the structure. Large deflections and strain hardening are considered. The theory is applied to the case of a shell undergoing axially symmetric collapse. (Author)

AD-610 068 Div. 25
OTS Prices: HC $3.00/MF $0.75

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SPIN-WAVE EFFECTS IN THE MAGNETIZATION REVERSAL OF A THIN FERROMAGNETIC FILM,
by K. J. Harte. 27 Aug 64, 92p LL-TR-364
Contract AF19 628 500
ESD TDR64 366

Unclassified report

Descriptors: (*Magnetic properties, Ferromagnetic materials), (*Ferromagnetic materials, Films), (*Thin films (Storage devices), Magnetic properties), (*Magnetic resonance, Thin films (Storage devices)), Magnetic fields, Ferromagnetism, Transients, Equations, Motion, Continuum mechanics, Quantum mechanics, Spin, Magnetic moments, Damping, Vector analysis, Power series.

Table of Contents:
Introduction;
Magnetostatic field of a nonuniformly magnetized thin film;
Static equilibrium: Magnetization ripple;
Uniform magnetization reversal;
Spin-wave theory: Quasistatic spectrum and transient response;
Effect of spin waves on magnetization reversal;
Appendix A - Notation; Parameters of a Typical Permalloy Film (TPF);
Appendix B - Coupling of Ripple Components;
Appendix C - On the WKB Method;
Appendix D - The Critical Field.

AD-610 070 Div. 25, 20
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
ENERGY MOMENTUM CONSERVATION AND SOME OF ITS CONSEQUENCES FOR THE CLASSICAL PARTICLE.
Physical sciences research papers,
by E. J. Post. Dec 64, 28p AFCRL 64-954, AFCRL PSRP-68
Proj. 5635

Unclassified report

Descriptors: (*Elementary particles, Momentum), Tensor analysis, Vector analysis, Electromagnetic waves, Quantum mechanics, Pions, Neutrons, Antiparticles, Electrons, Positrons, K mesons, Electric moments, Magnetic moments, Invariance, Integration.

Mechanical energy and momentum (e-m) has an equivalent counterpart in electromagnetic energy and momentum (e-m) and vice versa it conservation is assumed for the sum of these two fundamental manifestations of e-m. The classical particle concept is reconsidered in the spirit of Kwal's emphasis on an invariant relation between the e-m tensor and the e-m

vector. The notion of a mass-carrying particle is specified by introducing a concept of physical rigidity which permits a straight-forward definition of states of rest and motion of particles and their associated fields. It then follows that an optional electromagnetic interpretation of rest-mass applies to every particle-like object which in a rest-frame is surrounded by an electrostatic or a magnetostatic field (for example, (+) and (-) pion, neutron and anti-neutron). The conclusion also holds for particles characterized by a combination of an electric monopole and a magnetic dipole (for example, positron and electron), provided some simple symmetry requirements are met. The electromagnetic option for a neutral particle without a magnetic moment but with a rest mass (for example, pion and K meson) is that of a (temporarily) trapped standing wave. (Author)

AD-610 071 Div. 25, 5, 8, 19
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
TRANSMISSION OF GREEN LASER LIGHT (5300A) THROUGH WATER,
by D. E. Matlack, H. A. Templin, and W. W. Talbert.
18 Sep 64, 29p
Task RUDC4B000 212 1F001 05 02
NOL TR64 179

Unclassified report

Descriptors: (*Light transmission, Water), (*Lasers, Light transmission), (*Water, Light transmission), Neodymium, Light, Colors, Electromagnetic waves, Propagation, Liquids, Attenuation, Underwater communication systems, Measurement, Test methods, Test equipment, Optical equipment, Naval research laboratories, Optics, Range finding, Underwater.

The extinction coefficient of filtered Potomac River water was measured at the frequency doubled neodymium 'green laser' wavelength of 5300A. Measurements were conducted in situ at the David Taylor Model Basin (DTMB) in a cooperative program with the Naval Research Laboratory (NRL). Extinction coefficients of 0.097, 0.104 and 0.119/m were measured on 4, 5 and 8 June 1964, respectively. The increase in attenuation with time is confirmed by filtered arc light measurements made by the NRL and is attributed to contamination of the water after the basin filtration system was turned off. Scattering experiments indicate that the aureole effect for the highly collimated laser beam was small over the 200 meter range of the measurements. (Author)

AD-610 078 Div. 25
OTS Prices: HC $4.00/MF $1.00

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
A REVIEW OF RECENT INVESTIGATIONS INTO FRACTURE INITIATION AT GALCIT.
Rept. for Dec 60-Jun 64,
by J. L. Swedlow and M. L. Williams. Oct 64, 136p
GALCIT SM 64-19
Contract AF33 616 7806, Proj. 7063, Task 706302
ARL 64 175

Unclassified report

Descriptors: (*Fracture (Mechanics), Reviews), Aeronautical laboratories, Stresses, Mathematical analysis, Elasticity, Structural shells, Cylindrical bodies, Deformation, Ductility, Metal plates, Thickness, Numerical analysis, Boundary value problems, Integral equations, Series, Functions, Brittleness, Graphics.

Investigations into the mechanics of fracture initiation have been made with especial emphasis on the effects of initial sheet curvature, the interaction of applied extensional and bending stresses, the role of plastic flow near the crack tip, and the significance of finite plate thickness. There has also been some work performed along more classical lines including a review of Griffith's theory of brittle fracture, an analysis of a penny-shaped crack in a shear field, and a study of certain analytical methods for treating crack problems.

AD-610 079 Div. 25
OTS Prices: HC $1.00/MF $0.50

Uppsala Univ. (Sweden).
QUANTUM THEORY OF MANY-PARTICLE SYSTEMS.
Annual summary rept. for 1 Sep 63-31 Aug 64.
31 Aug 64, 8p
Contract AF61 052 701
ARL 65 25

Unclassified report

See also AD-429 228.

Descriptors: (*Quantum mechanics, Elementary particles), (*Elementary particles, Quantum mechanics), N-body problem, Chemistry, Molecular properties, Molecular structure, Solid state physics, Atomic energy levels, Atomic structure, Atoms, Molecules, Protons, Electrons, Theory, Spin, Valence, Perturbation theory, Matrix algebra, Operators (Mathematics), Crystal lattices, Harmonic oscillators, Atomic orbitals, Symposia, Sweden, Bibliographies.

A chronological list is presented of the conferences, research reports, and published papers of the quantum chemistry group for research in atomic, molecular, and solid-state theory at Uppsala University, Uppsala, Sweden.

AD-610 080 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Israel Inst. of Tech., Haifa.
LIOUVILLE-EQUATION IN RELATIVISTIC DYNAMICS.
Technical note no. 2,
by G. Kalman. 30 Sep 61, 5p
Contract AF61 052 393
ARL 236

Unclassified report

Descriptors: (*Statistical mechanics, Relativity theory), (*Relativity theory, Statistical mechanics), Dynamics, Mechanics, Equations, Motion, Hamiltonian, Operators (Mathematics), Probability, Statistical distributions, Partial differential equations, Israel.

Although (a) Liouville-equation is based on a Hamiltonian formalism and (b) there is no Hamiltonian in relativistic dynamics, it is shown that the modified Hamiltonian description of Schmutzer leads to the Liouville-equation again: it can serve as a foundation for relativistic statistical mechanics. (Author)

AD-610 082 Div. 25, 8
OTS Prices: HC $4.00/MF $0.75

Conductron Corp., Ann Arbor, Mich.
COHERENT LIGHT INVESTIGATION, VOLUME III,
by G. Cochran, L. Cutrona, A. Ingalls, I. Kay, and A. Sabersky. Oct 64, 111p D-5210-72-T80-110
Contract AF33 615 1014

Unclassified report

See also AD-606 323.

Descriptors: (*Optics, Mathematical analysis), (*Light, Electromagnetic properties), (*Lasers, Radar), Functions, Electron optics, Mathematical models, Optical equipment, Photographic analysis, Filters (Electromagnetic wave), Antennas, Targets, Acceleration, Rotation, Measurement, Electromagnetic waves, Propagation.

This volume presents an essentially new theory for analyzing optical systems in terms of transfer functions and presents discussions of optical systems employed normally with coherent light. This volume also discusses the general theory of holograms and complex spatial filters. The production of two-and three-dimensional holograms using coherent light and its implications for synthetic antenna applications, complex filters, matched filters and general filtering systems are described. Practical details on experimental results are also given. Also, in this volume is contained discussions on the use of a laser for measurements of target acceleration and rotation rates and on the problem of testing large reflective optics. (Author)

AD-610 087 Div. 25, 4, 30
OTS Prices: HC $3.00/MF $0.75

Westinghouse Research Labs., Pittsburgh, Pa.
TRANSPORT STUDIES OF DEFECT STRUCTURE INORGANIC COMPOUNDS: TRANSPORT STUDIES OF DEFECT STRUCTURE OXIDES.
Semi-annual technical rept. for 1 Apr-30 Sep 64. 30 Sep 64, 67p
Contract Nonr380000, Proj. NR359 555, ARPA Order 300 62
Unclassified report

Descriptors: (*Crystal lattice defects, Inorganic compounds), (*Electrochemistry, Electrolytic cells), (*Semiconductors, Transport properties), (*Thorium compounds, Oxides), (*Yttrium compounds, Oxides), (*Laboratory furnaces, Induction heating), Electrodes, Platinium, Reduction (Chemistry), Hydrogen peroxides, Perchloric acid, Decomposition, Solid solutions, Oxygen, Impurities, Conductivity, Phase studies, Electrical conductance, Microstructure, Ceramic materials, Refractory materials, Radiofrequency generators.

Contents:
The effect of electrode pretreatment on the oxygen reduction on platinum in perchloric acid
Conductivity processes at high doping levels
Defect structure and electrical conductivity of ThO2-Y2O3 solid solutions
High temperature induction furnace with oxide susceptors.

AD-610 094 Div. 25
OTS Prices: HC $2.00/MF $0.50

California Univ., Santa Barbara.
QUANTITATIVE STUDIES BY OPTICAL SPECTROSCOPY OF ENERGY EXCHANGE MECHANISMS IN SIMPLE GASES AND SOLIDS.
Semi-annual technical rept. no. 2, 1 Jul-31 Dec 64,
by H. P. Broida, G. A. Woolsey, K. Schofield, E. L. Milne, and J. S. Margolis. 1 Jan 65, 32p
Contract Nonr422201, ARPA Order 125
Unclassified report

Descriptors: (*Atomic energy levels, Plasma medium), (*Plasma medium, Atomic energy levels), (*Solids, Atomic energy levels), (*Spectroscopy, Atomic energy levels), Vibration, Microwaves, Excitation, Perturbation theory, Carbon dioxide, Monoxides, Nitrogen compounds, Oxides, Hydrogen, Helium, Mixtures, Silicon compounds, Halogen compounds, Germanium compounds.

Emission studies have continued in fast flow systems of nitrogen energized in a microwave discharge. By changing parameters of pressure, temperature, and mixture, silicon tetrahalides added after the discharge have produced two electronic systems of SiN, and two separate, unidentified emitters in the green and in the orange spectral regions. Addition of CO2, N2O and CO has shown near infra-red emission of these molecules, caused by transfer of vibrational energy from the ground electronic state of molecular nitrogen. To further the understanding of the N2(+) emission observed in some afterglows, a detailed perturbation calculation for the v = 1 level of the B square sigma Σ state and the v = 11 level of the A square pi has been undertaken. A new set of studies in a well-behaved plasma produced by means of a brush cathode was undertaken. Spectroscopic, electron probe, and voltage-current measurements are being made in hydrogen and in hydrogen-helium mixtures at pressures near 1 mm Hg. The condensed phase studies of molecular solids has not had any significant results. (Author)

AD-610 101 Div. 25
OTS Prices: HC $2.00/MF $0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
CONDUCTION PHENOMENA IN RUTILE SINGLE CRYSTALS,
by John A. van Raalte. Nov 64, 37p
LIR-TR-195
Contracts AF33 616 8353, Nonr184110,
Proj. NR018 80118
Unclassified report

Descriptors: (*Rutile, Single crystals), (*Single crystals, Rutile), (*Conductivity, Rutile), Electrical conductance, Oxidation, Electric fields, Space charges, Electron transitions, Atomic energy levels, Electric currents, Oxygen, Titanium, Impurities, Photoconductivity, Color centers, Hall effect, Voltage.

The conduction properties of oxidized rutile single crystals have been studied in detail. Application of a constant d-c field results in a rise of conductivity which normally leads to thermal breakdown if the current is not externally limited. The rise starts after a 'delay' period which at room temperature may be hours or days; its length is determined by a critical amount of charge that must pass through the crystal before 'creep' sets in (typical value: 6 coul/sq m). The rate of rise of the conductivity is proportional to the magnitude of the electronic current; it reflects a change in the bulk of the crystal and is not due to changes in the electrode contact. The crystals can be restored to their original state by re-oxidation, e. g., in O2 for twelve hours at 800C. The rise in conductivity seems to be produced by two phenomena: filling of shallow traps with corresponding increase of the effective mobility, and injection of positive space charge as holes from the anode, which allows an increase in electron current by balancing negative space charge. A color cloud also originates at the cathode probably due to trapping of electrons.

AD-610 111 Div. 25
OTS Prices: HC $2.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
EXPERIMENTS RELATING TO REGENERATIVE LASER AMPLIFIER DESIGN.
Technical rept.,
by H. Jacobs, J. Castro, F. A. Brand, C. LoCascio, and G. Novick. Dec 64, 38p ECOM-2531
Proj. 1P6 22001A056, Task 1P6 22001A056 03
Unclassified report

Descriptors: (*Lasers, Amplifiers), Ruby, Reflection, Gain, Attenuation, Oscillation, Fluorescence, Atomic energy levels, Feedback.

Experiments and calculations are reported in efforts to determine the applicability of multiple reflection concepts to laser amplifier design. The data indicates at least qualitative agreement with proposed theories in that it is shown that if the regenerative amplifier is pumped with too much energy the amplification will decrease. Estimates of the population inversion of the amplifier show that as the pump light from the Xenon source irradiates the ruby crystal, the attenuation constant increases in the amplifier before amplifier oscillations appear, during the period of oscillations, and even after the amplifier oscillations cease. However, as the time between the quenching of the oscillation of the amplifier and the arrival of the input signal increases, the gain decreases. This effect is consistent with the multiple reflection theory. (Author)

AD-610 114 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
THE EFFECT OF A FOREIGN GAS ON THE ABSORPTION SPECTRUM NEAR A SERIES LIMIT, PT. II,
by O. B. Firsov. Dec 63, 16p AmMetSoc-T-R-418
Contract AF19 604 6113
TT 65 60825

Unclassified report

Vliyanie Inorodnogo Gaza na Spektr Pogloshcheniya Vblizi Granitsy Serii, II, trans. of Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (USSR) 1951, v. 21, no. 5, p. 634-641.

Descriptors: (*Absorption spectrum, Perturbation theory), (*Perturbation theory, Atomic energy levels), Quantum statistics, Statistical analysis, Probability, Integration, Quantum mechanics, Molecular structure, Electric fields, Electrons, Scattering, Gases, Pressure, Molecules, Excitation, Polarization, Series, Field theory, USSR, Atomic structure.

The shape of spectral lines is determined from the expression for the shift of a spectral atomic line in a foreign gas. Characteristic functions are used in the derivation. Thermal molecular motion is not considered. Consequently, the theoretical curves of line width as a function of the principal quantum number lie below the experimental curves. (Author)

AD-610 117 Div. 25
OTS Prices: HC $2.00/MF $0.50

Watertown Arsenal Labs., Mass.
A REVIEW OF THE THEORY OF LARGE ELASTIC DEFORMATIONS,
Monograph series,
by Edward W. Ross, Jr. May 62, 30p WAL-MS-44

Unclassified report

Descriptors: (*Deformation, Theory), (*Elasticity, Theory), Stability, Reviews, Stresses, Strain (Mechanics), Mathematical analysis, Tensor analysis, Bibliographies.

The report provides an introduction to the theory of Large Elastic Deformations. Little in the way of detailed derivations is given. Rather, the ideas and results are given, referring the reader to the literature for details, in the hope that those who are unfamiliar with the subject may obtain (without excessive effort) a rough picture of the available information.

AD-610 118 Div. 25, 8, 30
OTS Prices: HC $1.00/MF $0.50

American Meteorological Society, Boston, Mass.
A HALL TEST BENCH FOR ROUTINE MEASUREMENTS,
by K. H. Herrmann. Jul 64, 8p AmMetSoc-T-G-221
Contract AF19 628 3880
TT 65 60828

Unclassified report

Ein Hallmessplatz fur Routinemessungen, trans. of Experimentelle Technik der Physik (East Germany) 1961, v. 9, no. 3, p. 106-109.

Descriptors: (*Measuring devices (Electrical and Electronic), Test sets), (*Hall effect, Measuring devices (Electrical and Electronic)), (*Electrical conductance, Measuring devices (Electrical and Electronic)), (*Test sets, Measuring devices (Electrical and Electronic)), Semiconductors, Crystals, Electrical properties, Temperature, Measurement, Electronic equipment, Design, East Germany.

This is a description of an apparatus for routine currentless measurements of dc and Hall resistances in rectangular semiconductor crystals over a range of seven orders of magnitude to an accuracy of 1.5%. (Author)

AD-610 123 Div. 25
OTS Prices: HC $1.00/MF $0.50

McGill Univ., Montreal (Quebec).
MULTIPLET ENERGIES OF d-n CONFIGURATIONS IN OCTAHEDRAL FIELDS.
by Richard Stevenson. Dec 64, 13p
Contract Nonr301300, Proj. NR018 503

Unclassified report

Descriptors: (*Atomic energy levels, Field theory), (*Field theory, Atomic energy levels), Molecular structure, Atomic orbitals, Absorption spectrum, Valence, Crystal structure, Transition elements, Electrostatic fields, Metals, Energy, Tables, Crystal lattices.

The technique of Racah and Shadmi for accurate calculation of the multiplet energies of d-n free atom systems is used to give a partial revision of Tanabe and Sugano's tables for octahedral field multiplets. The tables also indicate the effects of covalency as shown by a diminution of the gamma-3 orbitals. (Author)

AD-610 124 Div. 25
OTS Prices: HC $1.00/MF $0.50

McGill Univ., Montreal (Quebec).
ULTRAVIOLET ABSORPTION SPECTRA OF MnF2, KMnF3, RbMnF3, AND CsMnF3.
Technical rept.,
by Richard Stevenson. Dec 64, 20p
Contract Nonr301300, Proj. NR018 503

Unclassified report

Descriptors: (*Spectra (Visible and ultraviolet), Fluorides), (*Fluorides, Spectra (Visible and ultraviolet)), (*Antiferromagnetism, Low-temperature research), (*Absorption spectrum, Fluorides), Ultraviolet spectroscopy, Manganese compounds, Potassium compounds, Rubidium compounds, Cesium compounds, Liquefied gases, Air, Helium, Field theory, Crystal structure, Magnetic properties, Optics, Temperature.

Absorption spectra in the 3000-4000 A region are presented for MnF2, KMnF3, RbMnF3, and CsMnF3 at room temperature, liquid air temperature, and liquid helium temperature. The spectra are similar at room temperature, but marked differences appear at low temperatures due to the occurrence of an antiferromagnetic phase transition. The spectra are classified, and calculations of the positions of the room temperature lines are given in terms of a modification of ligand field theory. Values of the crystal field splitting and of a covalency parameter are given for the four crystals. Some classification of the low temperature lines is made in terms of the phenomena causing their occurrence. (Author)

AD-610 133 Div. 25, 26
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Blue Bell, Pa.
A FUNDAMENTAL STUDY OF EPITAXY BY FLASH EVAPORATION,
Semiannual scientific rept. no. 3, 1 Apr-30 Sep 64,
by John L. Richards. 30 Sep 64, 38p Philco-A049
Contract AF19 628 2937, Proj. 4608, Task 460805
AFCRL 64 918

Unclassified report

Descriptors: (*Semiconducting films, Epitaxial growth), (*Epitaxial growth, Semiconducting films), Crystallography, Indium alloys, Antimony Alloys, X-ray diffraction analysis, Evaporation, Mica, Hall effect, Experimental data, Temperature, Thickness, Electrical properties.

Electrical measurements have been made on InSb films deposited on mica substrates. The perfection of isoepitaxially deposited InSb films has been studied using X-ray double diffractometer methods. Films of high crystalline quality have been deposited. (Author)

AD-610 134 Div. 25, 14, 27
OTS Prices: HC $2.00/MF $0.50

Mechanical Technology, Inc., Latham, N. Y.
AN EXPERIMENTAL STUDY OF FRICTION IN ELASTOHYDRODYNAMIC LUBRICATION,
by M. D. Longfield. 28 Aug 64, 27p MTI-64TR63
Contract Nonr372900

Unclassified report

Descriptors: (*Friction, Lubrication), (*Lubrication, Hydrodynamics), Torque, Lubricants, Pressure, Viscosity, Loading (Mechanics), Disks, Velocity, Sliding contacts, Roll, Temperature, Elasticity, Films, Thickness.

Measurements of friction torque have been made on a disk machine by introducing a torque sensor into the drive to one of the disks. Experimental readings of torque have been made for loads up to approximately 40,000 psi maximum Hertzian contact pressure, for rolling speeds from 15.7 to 314 inches per second and for sliding speeds up to 130 inches per second. A comparison has been made between two oils of dissimilar characteristics. The friction torques developed with an oil of high pressure-viscosity exponent and low viscosity index form a strong contrast with the torques developed by an oil of relatively low pressure-viscosity exponent and high viscosity index. The difference is most marked at high loads and low sliding speeds - the pressure sensitive oil developing much larger coefficients of friction. The dependence of friction upon load and sliding speed is in accordance with recent theories of elastohydrodynamic lubrication. It has been confirmed that the effective viscosity within the contact is dependent on the rolling speed of the disks. Data is presented showing the variation of the pressure-viscosity exponent with rolling speed.

AD-610 139 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
ON LINEAR EQUATIONS OF ISOTROPIC ELASTIC PLATES AND SHELLS,
Scientific rept. no. 2,
by Yi-Yuan Yu. Feb 64, 37p
Contract AF49 638 1290
AFOSR 64 2088

Unclassified report

Descriptors: (*Elastic shells, Mechanics), (*Differential equations, Elastic shells), Equations, Motion, Integration, Partial differential equations, Boundary value problems, Elasticity, Cylindrical bodies, Deformation, Stresses, Isotropism, Strain (Mechanics), Series, Vibration, Structural shells, Calculus of variations, Mathematical analysis, Mathematical analysis, Theory, Dynamics, Hamiltonian.

A generalized Hamilton's principle and the associated variational equation of motion for nonlinear elasticity theory were given in a previous paper. Presented in this paper is a modified linearized version, from which the corresponding variational principle for an isotropic shell of arbitrary thickness is deduced by means of the series expansion method. The complete system of shell equations are obtained as the Euler equations. These reduce to Mindlin's result for isotropic plates as a special case. When the infinite series is truncated, the first-order approximation yields for the shell the stress equations of motion of the usual type, the strain-displacement relations given previously by Sanders, and, with the exception of those for transverse shearing stresses and strains, the stress-strain relations that are reducible to those given by Reissner. (Author)

AD-610 140 Div. 25, 13
OTS Prices: HC $3.00/MF $0.50

Polytechnic Inst. of Brooklyn, N. Y.
DAMPING PARAMETERS OF LAYERED PLATES AND SHELLS,
Scientific rept. no. 3,
by Yi-Yuan Yu and Nann Ren. Apr 64, 52p
Contract AF49 638 1290
AFOSR 64 2087

Unclassified report

Descriptors: (*Sandwich panels, Damping), (*Structural shells, Damping), (*Damping, Structural parts), Vibration, Metal plates, Sandwich construction, Cylindrical bodies, Frequency, Theory, Thickness, Equations, Numerical analysis.

The concept of the damping parameter is clearly applicable to all types of layered plates and shells and to all types of vibrations. Thus, expressions for the damping parameters are now available for extensional vibrations of sandwich plates and axially symmetrical vibrations of sandwich cylindrical shells as well as for flexural vibrations of sandwich plates. A comprehensive review of these is given in the present paper. In addition, the damping parameters for the two-layered plate are discussed. They are important because the two-layered plate represents a basic situation in which damping of the vibration of a plate by an added viscoelastic layer was first adopted in practice. In all cases considered, expressions are given for the frequencies together with the damping parameters.

AD-610 141 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Israel Inst. of Tech., Haifa.
NON-GEODESIC MOTION IN GENERAL RELATIVITY.
Scientific rept. no. 11,
by A. Peres. 24 Sep 64, 5p
Grant AF EOAR64 20
ARL 65 26

Unclassified report

Descriptors: (*Relativity theory, Particle trajectories), Quantum mechanics, Field theory, Perturbation theory, Acceleration.

An exact solution of the Einstein equations is constructed in which a point singularity moves along a trajectory which is not a geodesic of the background space.

AD-610 142 Div. 25, 15
OTS Prices: HC $1.00/MF $0.50

Israel Inst. of Tech., Haifa.
FEYNMAN DIAGRAMS WITHOUT FIELD THEORY.
Scientific rept. no. 12,
by A. Peres. 24 Sep 64, 6p
Grant AF EOAR64 20
ARL 65 27

Unclassified report

Descriptors: (*Perturbation theory, Quantum mechanics), (*S-matrix, Perturbation theory), Elementary particles, Field theory, Operators (Mathematics), Hamiltonian, Matrix algebra, Spin, Electromagnetic fields, Graphics, Particle trajectories, Bosons, Momentum, Functional analysis.

It is shown that the whole theory of Feynman diagrams can be derived without using quantized fields, or creation and annihilation operators.

AD-610 146 Div. 25, 15
OTS Prices: HC $5.00/MF $1.00

Ohio State Univ. Research Foundation, Columbus.
A STUDY OF THE POINT MATCHING METHOD AS APPLIED TO THERMALLY AND TRANSVERSELY LOADED PLATES AND OTHER BOUNDARY VALUE PROBLEMS.
Summary technical rept. no. 1, Nov 62-Nov 63,
by F. W. Niedenfuhr, Arthur W. Leissa, and C. C. Lo.
Oct 64, 168p
Contract AF33 657 8772, Proj. 1467, Task 146702
FDL TR64 159

Unclassified report

Descriptors: (*Boundary value problems, Structural parts), (*Structural parts, Loading (Mechanics)), Differential equations, Mathematical analysis, Thermal stresses, Boundary layer, Shear stresses, Geometric forms, Heat treatment, Deflection, Functions, Elasticity, Motion.

The purpose of the work undertaken was to develop further the point-matching technique for application to thermally and transversely loaded plates and associated boundary value problems; to develop computer programs, based upon the method, which are capable of universal usage to solve plate problems involving arbitrary shape and loading; to demonstrate the use of the computer programs on practical problems; and to investigate the mathematical convergence properties of the method. The equations of linear, thin, elastic plate theory, including thermal effects, are presented. Solutions to the governing differential equation require complementary and particular parts. Application of the point matching method to other boundary value problems solvable in terms of harmonic and biharmonic functions is described; e.g., torsion, conductive heat transfer, plane elasticity, slow motion of a viscous fluid, membrane deflection, and electromagnetics. A method of analyzing plates having both transverse and in-plate loads is presented. This method uses an iterative application of the point matching technique. (Author)

AD-610 147 Div. 25, 9
OTS Prices: HC $4.00/MF $0.75

Purdue Research Foundation, Lafayette, Ind.
INVESTIGATION OF ENERGY TRANSFER IN A TUBE ARC HEATER.
Doctor's thesis,
by James Gary Skifstad. Jul 64, 112p
Contract AF33 657 10933, Proj. 7063, Task 706303
ARL 64 112

Unclassified report

Supported in part by the Office of Naval Research, Washington, D. C. and by a fellowship from the ALCOA Foundation.

Descriptors: (*Electric arcs, Plasma physics), (*Plasma medium, Transport properties), (*Heaters, Electric arcs), Gas flow, Pipes, Gas discharges, Helium, Stagnation point, Enthalpy, Plasma jets, Laminar flow, Differential equations.

Research is reported on the mutual interaction of an electric arc and a gas flow passing concurrently through a cylindrical tube. The problem considered is that of analyzing the flow and energy transport processes near the inlet region of the tube, under conditions where the diameter of the region containing the gas heated by the arc discharge is smaller than the diameter of the tube. Experimental data are presented for a tube, 3/8 inch in diameter, wherein helium gas is heated to bulk stagnation enthalpies above 20,000 B/lb. The data include the axial distributions of the heat flux to the tube wall, the potential distribution along the arc, the total voltage and current of the arc, and the distributions of the properties of the jet measured by means of a probe. An analysis of the flow and energy transport phenomena, based on the recent methods of laminar flow theory, is presented. The methods yield a system of simultaneous ordinary differential equations describing the flow field. Numerical computations are included. (Author)

AD-610 160 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley.
SPECTROSCOPIC AND THEORETICAL STUDIES OF MOLECULES WITH BONDING WHICH DEVIATES FROM NORMAL VALENCE RULES.
Final rept. for 1 Mar 61-28 Feb 65,
by George C. Pimentel. 15 Dec 64, 12p
Contract AF49 638 944; Grant AF AFOSR332 63
AFOSR 65 0068

Unclassified report

See also AD-413 870.

Descriptors: (*Chemical bonds, Molecular spectroscopy), (*Molecules, Chemical bonds), (*Infrared spectroscopy, Molecular properties), Valence, Low-temperature research, Solidified gases, Frequency shift, Free radicals, Halogen compounds, Molecular isomerism, Helium group gases, Photochemistry, Boron compounds, Oxygen, Nitrogen, Molecular association, Electron

bombardment, Lasers, Amines, Amides, Cryogenics, Carbon dioxide, Atoms, Argon, Xenon, Krypton, Spectrum analyzers.

Spectroscopic studies were made of the reactivity and molecular structure of free radicals and reactive molecules using the matrix isolation method. Spectroscopic studies were made of stable molecules selected to develop and expand the applicability of the matrix isolation method. New and novel spectroscopic techniques were developed to facilitate future infrared studies of chemical species with extreme reactivity.

AD-610 167 Div. 25, 8, 30
OTS Prices: HC $2.00/MF $0.50

Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF THE SCATTERING OF A LASER BEAM BY THE ELECTRONS OF A PLASMA.
Final technical rept.,
by D. W. McMorris and H. N. Olsen. Dec 64, 46p
NSL-64-168-1
Contract AF49 638 1336, Proj. 9752, Task 975201
AFOSR 65 0033
Unclassified report

Descriptors: (*Lasers, Probes (Electromagnetic)), (*Probes (Electromagnetic), Plasma physics), (*Electromagnetic waves, Scattering), (*Plasma medium, Scattering), Ruby, Electrons, Electromagnetic fields, Charged particles, Oscilloscopes, Cameras, Light, Optics, Electric arcs, Photomultipliers, Test methods.

The radiation scattered from the beam of a laser by free electrons of a test plasma has been investigated as a possible tool for plasma diagnostics at electron densities in the range of 10 to the 16th power/cc to 10 to the 17th power/cc and temperatures from 10,000K to 20,000K. A perturbing effect on the plasma background radiation was observed which masked the expected Thomson scattering. This perturbation is interpreted as a plasma heating resulting from energy transferred to the plasma from the laser beam by coupling of the electromagnetic field with the plasma charged particles. (Author)

AD-610 183 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

Applied Physics Lab., JHU, Silver Spring, Md.
INVESTIGATIONS OF GROWING WAVES EXCITED IN A PLASMA BY AN ELECTRON STREAM,
by John R. Apel and Albert M. Stone. Dec 64, 20p
TG-636, CPR-043
Contract NOw62 0604c
Unclassified report

Presented at the Annual Meeting (6th), Div. of Plasma Physics, American Physical Society, New York, 4-7 Nov 64.

Descriptors: (*Plasma oscillations, Electron beams), (*Electromagnetic waves, Plasma oscillations), Plasma medium, Magnetic fields, Hydrogen, Scattering, Electrons, Energy, Plasma physics, Excitation, Pumping (Electronics).

An experiment was constructed for the study of waves excited in a plasma by an electron stream. A PIG source generates a hydrogen plasma of density up to 10 to the 13th power/cc and 30 eV electron temperature, confined by a 500 gauss field. A 40-milliampere, 1000-volt electron beam is pulsed into the plasma. Coherent, growing waves are excited at frequencies typically near 500 mc when the plasma frequency is 1800 mc and the cyclotron frequency 900 mc. The wave grows in both space and time until reaching a limiting amplitude, after which it decays; this entire process repeats at about a 40 mc repetition rate at a power level of several watts. Diagnostic equipment includes a 3000 mc oscilloscope, a spectrum analyzer, and various probes. If the dispersion equation governing the waves is solved for the finite geometry of the experiment, it becomes apparent that the growth occurs because of the interaction between the slow plasma wave on the electron beam and the electron cyclotron wave in the plasma. (Author)

AD-610 193 Div. 25, 13, 31
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC TESTS OF CONICAL REDUCERS BETWEEN CYLINDERS WITH AND WITHOUT STIFFENERS AT THE CONE-CYLINDER JUNCTURES,
by Martin A. Krenzke. Feb 59, 24p DTMB-1187
Proj. NS731 038
Unclassified report

Descriptors: (*Pressure vessels, Hydrostatics), (*Structural shells, Cylindrical shells), (*Stiffened cylinders, Hydrostatics), Hydrostatic pressure, Stresses, Failure (Mechanics), Joints, Elasticity, Strain (Mechanics).

Six 45-deg unstiffened conical sections between cylinders of different diameters were subjected to external hydrostatic pressure to study the effect on collapse pressure of placing stiffeners at the junctures. These tests indicate that the collapse pressure depends on the deflection and rotation at the cone-cylinder junctures as well as on the geometry of the cone itself. For this series of reducer sections with stiffeners at the junctures, the collapse pressure appears to be associated with that pressure at which yielding first occurs at points other than at the juncture. No definite relation between initial yielding and collapse pressure for reducer sections without stiffeners at the junctures could be derived from the results of these tests. (Author)

AD-610 240 Div. 25, 27
OTS Prices: HC $4.00/MF $1.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF THE WALL-STABILIZED, TRANSPIRATION-COOLED DC ELECTRIC ARC.
Master's thesis,
by Ralph Noble Jones. Jun 64, 118p GAW/Mech-64-11
Unclassified report

Descriptors: (*Electric arcs, Energy conversion), (*Energy conversion, Electric arcs), (*Heaters, Electric arcs), Enthalpy, Theory, Mathematical models, Electric fields, Power supplies, Electric propulsion, Gas flow, Cooling, Nitrogen, Argon, Space propulsion, Plasma physics, Programming (Computers), Mathematical prediction.

An extension of previous investigations of a wall-stabilized, transpiration-cooled DC electric arc plasma generator was made. Numerical solutions for the energy exchange in the arc were obtained, and an extended theoretical model for the energy exchange was proposed. Measurements of radiative power losses indicated that use of the extended model may be necessary for accurate quantitative analysis, particularly in predicting the radiative losses. Investigation of an unusual spatial electric field strength fluctuation in the arc indicated that experimental error probably did not account for the observation. The latter assertion is upheld by other

experiments performed on similar devices at the University of Minnesota. Spatially nonuniform gas-injection patterns were found to improve the energy-conversion efficiency of the device. Means of further increasing the efficiency, and of extending the theoretical analysis of the device, are proposed. (Author)

AD-610 252 Div. 25, 15
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NONLINEAR MATRIX ANALYSIS OF DISCRETE ELEMENT STRUCTURES,
Master's thesis,
by John Charles Durrett. Aug 63, 72p
GAE/Mech-63-7

Unclassified report

Descriptors: (*Beams (Structural), Numerical analysis), (*Rods, Numerical analysis), (*Structural parts, Elasticity), Deflection, Deformation, Loading (Mechanics), Buckling (Mechanics), Structures, Matrix algebra.

This study presents two matrix theories: a general matrix theory for nonlinear, discrete bar element structures and a general matrix theory for nonlinear, discrete beam element structures. Both theories use a 'fictitious force' approach to account for large deflections. Numerical examples are worked using both theories. The deflections and critical buckling loads that are calculated using the bar element theory compare favorably with the exact values for the structures in question. The validity of the beam element theory can not be ascertained because of the lack of values for the exact deflections of the structure. (Author)

AD-610 261 Div. 25, 20, 30
OTS Prices: HC $2.00/MF $0.50

Mallinckrodt Chemical Labs., Harvard Univ., Cambridge, Mass.
MICROWAVE DOUBLE RESONANCE EXPERIMENTS,
by A. P. Cox, G. W. Flynn, and E. B. Wilson, Jr.
1963, 43p
Contract Nonr186614

Unclassified report

Presented, in part, at the June 1963 Ohio State Symposium on Molecular Structure and Spectroscopy.

Descriptors: (*Microwave spectroscopy, Molecular structure), (*Nuclear magnetic resonance, Microwave spectroscopy), Electron transitions, Atomic energy levels, Quantum mechanics, Molecular rotation, Selection rules, Organic compounds, Gases, Spectroscopy.

Double quantum transitions and certain changes in line intensities which can be ascribed to relaxation effects have been observed in a Stark effect spectrometer in which the absorbing gas was exposed to two microwave fields simultaneously. The general features of the line shape predicted by Javan for a three level system in the presence of two irradiating fields have been clearly observed in OCS and propylene oxide. Studies of various transitions in these molecules indicate the presence of either a double quantum emission or absorption line depending upon the energy level scheme in question. Observation of both zero-field and Stark transitions has revealed certain expected changes in line intensities. Several experimental arrangements for microwave double resonance are described and applications of this technique to the identification and confirmation of complex rotational spectra are discussed. (Author)

AD-610 266 Div. 25, 27
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
BUCKLING OF CORE-STABILIZED CYLINDERS UNDER AXIALLY-SYMMETRICAL EXTERNAL LOADS,
by D. O. Brush and B. O. Almroth. Jan 62, 32p
LMSC-6-90-62-6

Unclassified report

Descriptors: (*Buckling (Mechanics), Cylindrical bodies), (*Cylindrical bodies, Buckling (Mechanics)), (*Loading (Mechanics), Cylindrical bodies), Elasticity, Structural shells, Stability, Pressure, Distribution, Numerical analysis, Equations, Rocket motors (Solid propellant), Mechanical properties, Potential theory, Energy.

An equation is derived for the elastic stability of a circular cylindrical shell which is filled with a soft elastic core and is subjected to general axially-symmetrical lateral pressure combined with a central axial force. Numerical results are given for three lateral pressure distributions of interest in rocket motor case analysis: Uniform pressure, linearly varying pressure, and a circumferential band of pressure located at an arbitrary distance from one end of the cylinder. Comparison is made with results of previous theoretical and experimental investigations, where available. (Author)

AD-610 267 Div. 25
OTS Prices: HC $3.00/MF $0.75

Lockheed Missiles and Space Co., Sunnyvale, Calif.
BUCKLING OF ORTHOTROPIC CYLINDERS UNDER AXIAL COMPRESSION,
Technical rept.,
by B. O. Almroth. Jun 63, 53p LMSC-6-90-63-65

Unclassified report

Report on Solid Mechanics.

Descriptors: (*Buckling (Mechanics), Cylindrical bodies), (*Cylindrical bodies, Buckling (Mechanics)), (*Loading (Mechanics), Cylindrical bodies), Compressive properties, Structural shells, Elasticity, Numerical analysis, Potential theory, Graphics, Solids, Mechanics.

Previously derived equations for the buckling of axially loaded orthotropic cylinders are reviewed and solutions to the equations are given in graphical form. An analysis of the postbuckling behavior is also performed, and the applicability of the classical theory is discussed in the light of the results of that analysis. Finally, a practical method of analysis is suggested, and the buckling load determined by this method is compared with available test data. (Author)

AD-610 277 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RADIAL DISTRIBUTION OF CHARGED PARTICLE CONCENTRATIONS IN A MAGNETIC ION SOURCE,
by M. D. Gabovich and Yu. B. Ermolovich. 14 Dec 64
13p FTD-TT-64-442
TT 65 60983

Unclassified report

Unedited rough draft trans. of Ukrayins'kyi Fizychnyi Zhurnal (USSR) 1957, v. 2, no. 2, p. 165-173.

Descriptors: (*Ion sources, Plasma medium), (*Charged particles, Distribution), (*Plasma medium, Charged

particles), Plasma physics, Ion beams, Electron beams, Magnetic fields, Electrons, Density, Configuration, Space charges; Ionization, Ions, Functional analysis, Plasma oscillations, Cathodes, Anodes, USSR, Electric discharge, Beta particles.

The results of some experiments on a magnetic ion source are presented. The results show that the increase of magnetic field is accompanied by the appearance of a main discharge column, the radius of which approaches the cathode radius. This column is a plasma pierced by the fast primary electrons. The law of the radial discharge distribution inside the column differs from that outside the column if the magnetic field is large enough. An equation is obtained for radial distribution of the charged particles concentration. It is based on the following assumption. Ionization is produced mainly by the fast primary electrons, but the neutralization of the positive space charge takes place chiefly because of the slow electrons. The electrons generated in the column leave it because of the radial diffusion weakened by the magnetic field influence. The ions produced in the column leave it chiefly along the 'potential groove' to the ends of the vessel.

AD-610 294 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SECOND SECTION OF GROUND EXPERIMENTS WITH WEIGHTLESS LIQUIDS,
by V. V. Shuleikin. 4 Jan 65, 9p FTD-TT-64-613
TT 65 61006

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 153, no. 6, p. 1299-1302.

Descriptors: (*Liquids, Weightlessness), (*Weightlessness, Liquids), Water, Organic compounds, Mercury, Falling bodies, Photographic analysis, Motion pictures, Mechanical waves, Surface properties, Propagation, Geometric forms, Partial differential equations.

The first investigations were made to reveal the interferences which may sharply complicate the behavior of a weightless liquid in comparison with elementary theoretical scheme. In the second series of investigations, well purified liquids, mercury, distilled water, and bromobenzene were tested. Motion picture equipment was inclosed in the free falling shell. The diameter of the chronoscope face plate corresponds to 30 mm.

AD-610 295 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
FREQUENCY DISPLACEMENT DURING DIFFUSION OF LIGHT IN RELATIVISTIC PLASMA,
by O. Pogutse. 4 Jan 65, 7p FTD-TT-64-614
TT 65 61007

Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, 1963, v. 153, no. 3, p. 578-580.

Descriptors: (*Plasma medium, Optical properties), Light, Diffusion, Scattering, Frequency shift, Doppler effect, Relativity theory, Statistical distributions, USSR.

The diffusion of light by isotropic plasma with Maxwellian distribution function is discussed. It is shown, that when relativism is taken into consideration, the maximum of diffused light is displaced into the zone of higher frequencies. In case of a sharp relativism, the relative frequency displacement, corresponding to the maximum of scattered radiation, is of the order of 1/(1-Beta sub T). The results obtained may be of interest to diagnose high temperature plasma. (Author)

AD-610 304 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
SUPERFLUIDITY OF He3,
by V. P. Peshkov. 22 Dec 64, 9p
FTD-TT-64-1049
TT 65 61015

Unclassified report

Unedited rough draft trans. of Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (USSR) 1964, v. 46, no. 4, p. 1510-1513.

Descriptors: (*Helium , Liquefied gases), (*Liquefied gases, Helium), Cryogenics, Isotopes, Galvanometers, Specific heat, Heat transfer, Cerium compounds, Magnesium compounds, Nitrates.

The possibility of superfluid He(3) was investigated. To obtain the lowest temperatures in He(3), a device with a threestage demagnetization of the paramagnetic salts was developed. A description of the device is given and experimental data is reported briefly.

AD-610 317 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
STUDY OF SOLID-STATE AND TRAVELING-WAVE MASER TECHNIQUES.
Interim rept.,
by J. A. DeGruyl, W. W. Heinz, S. Okwit, and J. G. Smith.
Jan 65, 49p
Contract AF30 602 2989, Proj. 4506, Task 450602
RADC TDR64 480

Unclassified report

Descriptors: (*Masers, Broadband), Solid state physics, Traveling-wave tubes, Magnetic fields, Bandwidth, Metal films, Solenoids, Semiconductor devices, Pumping (Electronics), Tunneling (Electronics), Cavity resonators, Limiters, Germanium, Microwave amplifiers, Cryogenics.

The purpose of this program is to develop improved maser techniques and apply them to a broad-band maser system. Magnetic shimming techniques capable of providing the proper field gradients in a superconducting solenoid have been successfully tested. The analysis of broad-banding was extended to include the effects of non-ideal magnetic field gradients and RF field distributions in the TWM structure. Correlation between theory and experiment is now much improved, facilitating the evaluation and application of these techniques to a deliverable breadboard. Limiting characteristics in a broad-band stripline semi-conductor limiter at 4.2K have been obtained. Techniques to decrease the limiting by using a more resonant, ridged waveguide structure are being developed. An analysis of a fine-wire super-conducting limiter indicates that the operating bandwidth of such a device would be too narrow for the intended application. An analysis of the feasibility of superconducting thin-film tunneling techniques as a pump source for masers has been completed and is presented. The obtainable power levels appear to be insufficient for maser pumping. Other solid-state techniques are being evaluated. (Author)

AD-610 321 Div. 25
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana. Engineering Experiment Station.
THEORY OF THE LASER INTERFEROMETER AND ITS USE IN PLASMA DIAGNOSTICS.
Scientific rept. no. 1,
by J. B. Gerardo, J. T. Verdeyen, and M. A. Gusinow.
1 Dec 64, 100p
Grant DA ARO D31 124G582, Projs. 4832p, 20010501B700
AROD 4832 2

Unclassified report

Descriptors: (*Lasers, Interferometers), (*Interferometers, Lasers), (*Plasma medium, Refractive index), (*Probes (Electromagnetic), Plasma medium), Ionospheric propagation, Gas ionization, Electron density, Microwave equipment, Microwave networks, Frequency modulation, Oscillation, Equations, Plasma physics.

The theory of the laser interferometer and its application in investigations of relatively dense to very dense gaseous plasmas is discussed. It is shown that the sensitivity of the interferometer can be greatly improved by utilizing a spherical geometry reference cavity rather than one formed by planar mirrors. The parameters that determine the sensitivity of a spherical geometry laser interferometer are discussed and detailed theory of such is given. Particular emphasis is placed on determining the maximum frequency response of the interferometer. The parameters that limit the frequency response are discussed and it is shown that by proper selection of these parameter and proper detection techniques, it is possible to detect resonances at rates in excess of 50 per microsecond. (Author)

AD-610 341 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BASIC PROPOSITIONS OF ELECTRON-TAUTOMERISM THEORY IN THE LIGHT OF NEW ELECTRON CONCEPTS,
by V. V. Razymovskii. 8 Dec 64, 13p
FTD-TT-64-1050
TT 65 61035

Unclassified report

Unedited rough draft trans. of Zhurnal Obshchei Khimii (USSR) 1964, v. 34, no. 5, p. 1693-1695.

Descriptors: (*Molecular isomerism, Electron density), (*Electron density, Molecular isomerism), (*Electrons, Theory), Molecular association, Molecular structure, Chemical bonds, Chemical reactions, Reaction kinetics, Exchange reactions, Polyatomic molecules, Halogen compounds, Quantum mechanics, Chemistry, Space charges, Atomic energy levels, Nuclei, Electron transitions, USSR.

The propositions of electron-tautomerism theory with respect to covalent and ionic bond types are shown to coincide basically with the newest treatment of the chemical bond in quantum chemistry and to have now an experimental basis.

AD-610 346 Div. 25
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE EFFECT OF A TRANSVERSE MAGNETIC FIELD ON RESISTANCE OF PLATE,
by A. Tsinober and E. Shcherbinin. 21 Dec 64, 9p
FTD-TT-64-803
TT 65 61019

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Latviiskoi SSR, Riga. Izvestiya, 1963, no. 6(191) p. 43-48.

Descriptors: (*Magnetohydrodynamics, Resistance (Electrical)), (*Resistance (Electrical), Magnetic fields), Metal plates, Boundary layer, Numerical analysis, Plasma physics.

A description is given of an experimental investigation of the effect of a transverse magnetic field on the resistance of a plate around which is directed a laminar flow of electroconductive liquid. An approximate calculation is made of boundary layer on a plate in the presence of a magnetic field. The experimental and the calculated data are compared.

AD-610 354 Div. 25, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE SELF-MODELING MOVEMENTS OF AN IDEAL PERFECT HEAT-CONDUCTING GAS,
by S. I. Fadeev. 22 Dec 64, 13p FTD-TT-64-502
TT 65 61027

Unclassified report

Unedited rough draft trans. of Inzhenernyi Zhurnal (USSR) 1963, v. 3, no. 2, p. 367-373.

Descriptors: (*Plasma medium, Thermal conductivity), (*Thermal conductivity, Plasma medium), (*Gases, Motion), Plasma physics, Viscosity, Heat transfer, Shock waves, High-temperature research, Boundary value problems, Partial differential equations, USSR.

The self-modeling motion of a perfect heat-conducting gas, with a great though finite value for the coefficient of heat conductivity was considered.

AD-610 360 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
ELECTRICAL ANHARMONICITIES OF DIATOMIC MOLECULES.
Technical (Scientific) note no. 13,
by Nathan Jacobi. Nov 64, 8p
Contract AF61 052 388
AFCRL 64 1022

Unclassified report

Descriptors: (*Diatomic molecules, Electrical properties), (*Molecular spectroscopy, Diatomic molecules), Band spectrum, Dipole moments, Line spectrum, Chemical bonds, Vibration, Rotation, Israel.

While electrical anharmonicities were not included in the well-known treatment of Herman and Wallis - dealing with vibration-rotation interactions in diatomic molecules, they cannot be neglected when intensities of overtone bands are treated. The Herman and Wallis theory is extended here and values are given for electrical anharmonicities calculated from the overtone bands of a number of diatomic molecules. (ARDC abstract)

AD-610 361 Div. 25
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Pittsburgh, Pa.

GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.
Quarterly technical rept. no. 6,
1964 , 10p
Contract AF49 638 1245

Unclassified report

See also AD-608 965.

Descriptors: (*Rare earth compounds, Single crystals), (*Single crystals, Crystal growth), (*Crystal growth, Rare earth compounds), Europium compounds, Sulfides, Chromium compounds, Bromides, Epitaxial growth, Impurities, Silicon, Lanthanum, Fracture (Mechanics), Electrical conductance, Simiconducting films, Gadolinium alloys, Solid solutions, Crystal lattices, Nuclear spins, Chromium alloys, Tellurium alloys, Antimony alloys, Magnetic properties.

Large size single crystals of EuS were grown from the melt. Also crystals of Si-doped CrBr3 having the shape of semispheres were epitaxially grown upon the (111) surface of single crystal substrates of CaF2. Work was continued on the electrical conductivity of La-doped EuS. The effect of impurity scattering on the electrical resistivity of Gd was studied for the solute elements of La and all rare earths except Pm, Eu, and Yb. The study of the magnetic structures of the CrTe-CrSb system was confined to the CrTe-rich solutions.

AD-610 362 Div. 25
OTS Prices: HC $2.00/MF $0.50

General Dynamics/Astronautics, San Diego, Calif.
HIGH-TEMPERATURE SPECTRA OF THE PURE ROTATIONAL BAND OF H2O.
Technical rept.,
by C. B. Ludwig, C. C. Ferriso, W. Malkmus, and F. P. Boynton. Dec 64, 38p GDA-DBE64-069
Contract Nonr390200

Unclassified report

Rept. on Proj. DEFENDER.
See also AD-403 392.

Descriptors: (*Water vapor, Band spectrum), (*Band spectrum, Infrared spectroscopy), (*Molecular spectroscopy, Water vapor), Rotation, Molecular rotation, Atomic energy levels, Vibration, High temperature research, Infrared radiation, Emissivity, Mathematical models, Statistical analysis, Gases, Spectrum analyzers, Absorption.

The short wavelength wing of the pure rotation emission spectrum of water vapor has been measured at temperatures between 550 and 2200K and at a nearly constant optical depth of .00024 g/sq cm. Apparent line positions and relative intensities agree with those determined from previous work. An approximate calculation of the local mean spectral absorption coefficient has been performed. This calculation is the weighted mean value of results obtained using energy levels of the prolate spheroidal top and of the 'most asymmetric' top. A comparison of the results of the calculation (applying the statistical band model using parameters obtained in vibration-rotation bands) with the experimental data indicates that the calculation is acceptable for the long wavelength contribution to the total emissivity of hot water vapor. An estimate of the integrated band intensity has been obtained. (Author)

AD-610 364 Div. 25, 17
OTS Prices: HC $2.00/MF $0.50

RIAS, Inc., Baltimore, Md.
AN INVESTIGATION OF THE DEFECT SOLID STATE.
Final rept. for 1 Jan 62-31 Dec 64,
by J. N. Maycock and H. R. Peiffer. 31 Dec 64, 48p
Contract Nonr370700

Unclassified report

Descriptors: (*Crystal lattice defects, Physical properties), Copper, Deformation, Cold working, Cadmium, Gold, Electrical resistance, Heat treatment, Recrystallization, Crystal substructure, Impurities, Spectroscopy.

The following line of approach was used in order to obtain a more systematic understanding of point defect formation and annihilation. (1) An investigation of the resistivity increase associated with point defects, produced by cold-working copper, as a function of the resistivity increase associated with line defects. (2) An investigation of how the prior condition of a metal effects its subsequent deformation properties. (3) An investigation of the recovery spectrum of pure and doped hexagonal metals together with a simultaneous investigation of the f.c.c. and b.c.c. metals. (Author)

AD-610 365 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Frick Chemical Lab., Princeton Univ., N. J.
RAMAN SPECTRUM OF CRYSTALLINE AND LIQUID SO2.
Technical rept. no. 18,
by A. Anderson and R. Savoie. Jan 65, 18p
Contract Nonr185827, Proj. NR019 143

Unclassified report

Descriptors: (*Sulfur compounds, Raman spectroscopy), (*Raman spectroscopy, Sulfur compounds), Dioxides, Crystals, Liquids, Crystallography, Spectroscopy, Factor analysis.

The Raman spectrum of crystalline sulfur dioxide has been recorded at several temperatures between 9 and 185K. The main features are in accord with those predicted from the factor group analysis for the known structure of the crystal. Additional peaks were also observed, some arising from isotopic species and lattice fundamentals. As an aid to the assignment of several other bands, the spectrum of the liquid has also been recorded to distinguish the specifically crystalline features. Possible causes of these extra peaks, such as combinations with lattice modes, crystalline defects, and impurities are briefly discussed. (Author)

26. Production and Management

AD-609 900 Div. 26, 2
OTS Prices: HC $12.85/MF $4.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MANAGEMENT, PLANNING AND ECONOMICS OF AIRCRAFT PRODUCTION,
by D. P. Andrianov, M. Z. Gendel'man, A. V. Glichev, S. I. Didenko, and A. N. Zhuravlev. 1 Dec 64, 983p
FTD TT63 1121; TT 65 60699
Unclassified report

Unedited rough draft trans. of mono. Organizatsiya, Planirovanie i Ekonomika Aviatsionnogo Proizvodstva, Moscow, 1963, 694p.

Descriptors: (*Aircraft industry, USSR), (*Aircraft, Production), (*Management engineering, Aircraft industry), Management planning, Industrial production, Economics, Manufacturing methods, Costs, Textbooks.

This book presents an integrated analysis of problems relating to the economics of the aircraft industry and the organization and planning of production at individual enterprises. Specific problems of production organization at these enterprises are considered for the various individual types of aircraft plants, i.e., aircraft-construction, engine-building, instrument-making, etc. Organizational and planning features of production at series-production and experimental plants are presented. The book is to be used as a text for students at aviation institutions of higher education and may also prove useful for engineers and technicians employed in the aircraft industry.

AD-609 920 Div. 26, 11, 30
OTS Prices: HC $3.00/MF $0.50

General Technology Corp., Elgin, Ill.
PLANE SPIRAL SPRING UNDER UNIFORM ROTATION ABOUT ITS ARBOR,
by Huo-Hsi Pan. Aug 64, 51p TRX-1
Contract DA11 022AMC168A
Unclassified report

See also AD-609 921.

Descriptors: (*Helical springs, Elasticity), (*Springs, Elasticity), (*Mechanical engineering, Helical springs), Rotation, Momentum, Loading (Mechanics), Stresses, Strain (Mechanics), Deformation, Geometric forms, Mathematical analysis, Mechanics, Industrial equipment.

Under the assumption of the inextensibility of the spring element a solution is obtained based on the energy principle by considering the bending energy only. When special cases are taken, it is shown that this solution yields results which agree with the known results. As any specific solution will depend on the given shape of the spiral, a procedure to obtain the specific solution for any given spiral shape is outlined in this report. In addition, a specific solution to an assumed spiral shape of common usage is also presented. This may serve as an approximation to the problem of other but not too different spiral shapes. (Author)

AD-609 921 Div. 26, 11, 30
OTS Prices: HC $1.00/MF $0.50

General Technology Corp., Elgin, Ill.
AN INVESTIGATION OF THE BENDING OF ROTATING TORSION-BAR SPRINGS,
by Severino Koh. Aug 64, 24p TRX-2
Contract DA11 022AMC168A
Unclassified report

See also AD-609 922.

Descriptors: (*Torsion bars, Springs), (*Springs, Torsion bars), (*Mechanical engineering, Springs), Rotation, Momentum, Loading (Mechanics), Stresses, Strain (Mechanics), Deformation, Geometric forms, Elasticity, Mechanics, Industrial equipment.

The first three critical angular velocities, omega 1, omega 2 and omega 3 for torsion-bar-springs having representative rectangular and circular cross sections are plotted versus length of spring. In order to make circular and rectangular cross-sections comparable, three cases have been chosen, each of which gives, for the designated geometries, equal angles of twist per unit length for equal twisting moments. It can be seen that the second critical angular velocity is somewhat greater than twice that of the first and that the third critical angular velocity is correspondingly higher; this points to the value of pre-shaping the spring to conform to a mode shape higher than the first. The importance of spring length in determining critical angular velocities is also apparent.

AD-609 935 Div. 26, 8
OTS Prices: HC $1.00/MF $0.50

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING PROCESS AND EQUIPMENT FOR CONSTRUCTION OF ELECTRON-TUBE MOUNTS.
Quarterly progress rept. no. 8, 1 Apr-30 Jun 64,
by J. G. Thomas. 30 Jun 64, 12p
Contract DA36 039sc86741
Unclassified report

See also AD-608 177.

Descriptors: (*Welding, Ultrasonic radiation), (*Electron tubes, Welding), (*Ultrasonic radiation, Welding), Manufacturing methods, Electron tube parts, Tungsten alloys, Rhenium alloys, Wire, Costs, Welds.

Efforts are made to obtain a totally ultrasonically welded Type 6080WB tube with superior performance capabilities to those presently in production, while maintaining a competitive manufacturing cost. A tungsten-3% rhenium alloy wire has been developed with properties of significant interest to electron-tube manufactures. An investigation of the ultrasonic weldability of this wire has been included in the program as an additional area of study.

AD-609 944 Div. 26
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
INVESTIGATION OF MODIFIED POSITION, DOWN-HAND MIG WELDING OF 2014-T6 ALUMINUM ALLOY.
Research and development rept.,
by J. Haryung. 4 Dec 64, 22p SM-48366
Unclassified report

Descriptors: (*Aluminum alloys, Welding), (*Welding, Aluminum alloys), Welds, Automatic, Non-destructive testing, Porosity, Tensile properties, Radiography, Reliability, Hardness, Chemical analysis, Mechanical properties.

An investigation was made of the effects of varied

welding positions on weld qualities such as weld deposit soundness and uniformity, bead geometry, chemical composition, and mechanical properties. Automatic MIG welds were prepared in positions ranging from 0 to 35 degrees, up slope and down slope, using welding procedures closely approximating those used in the production of 2014-T6 aluminum alloy domes. Welds were non-destructively inspected, mechanically tested, and spectrographically analyzed. Variances in the welding position produced marked differences in porosity content and bead geometry but exerted no significant effect upon ultimate tensile properties. Minor differences in weld metal chemistry resulted from changes in the welding position. Dye-Penetrant and radiographic inspections disclosed that welds made in up-sloped positions contained fewer defects than those made in downhill directions. Welds made at up slopes of 15 to 30 degrees contained no internal or surface defects. (Author)

AD-609 947 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley. Metal Processing Lab.
VISIOPLASTICITY.
Progress rept. no. 2, 1 Jun-30 Sep 64,
by T. Altan, A. Shabaik, and E. G. Thomsen.
Sep 64, 9p
Contract NOw64 0070d

Unclassified report

Descriptors: (*Test methods, Deformation), (*Material forming, Metals), (*Deformation, Test methods), Stresses, Creep, Rolling (Metallurgy), Extrusion, Strain (Mechanics), Plasticity, Velocity, Difference equations, Power series, Programming (Computers), Presses (Machinery), Test equipment, Loading (Mechanics), Metallography.

Progress is reported on the application of visioplasticity to the complete solution of a certain class of forming problems. This method has as its aim the establishment of a real velocity field in an actual forming operation, as for example in rolling and extrusion, without any assumption whatsoever. Hence, only experimental errors will limit the accuracy of a flow field. Methods presently employed indicate that these errors can be kept to an acceptable minimum and that it will be possible to calculate strain rates and finite strains from the experimentally determined flow field without additional assumptions. Stresses and loads can be calculated afterwards by introducing the strain and strain rates into the plasticity equations, yield condition, and equilibrium equations under the assumption that the flow stress as function of strain and strain rate is available.

AD-609 948 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley. Metal Processing Lab.
VISIOPLASTICITY.
Progress rept. no. 3, 30 Sep-30 Nov 64,
by A. Shabaik, T. Altan, and E. G. Thomsen.
Nov 64, 13p
Contract NOw64 0070d

Unclassified report

Descriptors: (*Test methods, Deformation), (*Material forming, Metals), (*Deformation, Test methods), Stresses, Creep, Rolling (Metallurgy), Velocity, Plasticity, Programming (Computers), Programming languages, Strain (Mechanics), Difference equations, Taylor series, Power series, Transformations, Extrusion, Metallography.

The present effort in the study of the application of the visioplasticity method to the complete solution of forming problems was concentrated primarily on establishing workable computer methods. Two lines of approach were taken in processing the experimental data. These calculation methods were by the use of a 'finite difference method' and by a 'mathematical formulation of flow.' These methods will be described briefly in the present report, but we expect to give a full mathematical account of the methods in the next report and plan to append workable computer programs to that report. An attempt was made to compare potential flow with actual metal flow in plane strain to determine if the boundaries for potential flow could be adjusted in such a way that both the real and ideal flow fields are congruous.

AD-609 949 Div. 26, 30
OTS Prices: HC $1.00/MF $0.50

California Univ., Berkeley. Metal Processing Lab.
VISIOPLASTICITY.
Progress rept. no. 1, 6 Fed-31 May 64,
by T. Kadioglu, A. Shabaik, and E. G. Thomsen.
Jun 64, 8p
Contract NOw64 0070d

Unclassified report

Descriptors: (*Test methods, Deformation), (*Material forming, Metals), (*Deformation, Test methods), Stresses, Creep, Rolling (Metallurgy), Extrusion, Velocity, Theory, Plasticity, Measurement, Numerical analysis, Programming (Computers), Metallography.

The objective of the investigation is the refinement of the visioplasticity technique and its application to a wider variety of forming problems of which the rolling process will take a leading position. The possibility of predicting the final structure of the deformed material is explored and the determination of the velocity field refined.

AD-609 951 Div. 26, 14
OTS Prices: HC $2.00/MF $0.50

Linden Labs., Inc., State College, Pa.
MACHINING HIGH PURITY ALUMINA.
Quarterly rept. no. 1, 28 Jun-30 Sep 64,
by P. A. Marshall, Jr. and J. M. Infield. 30 Sep 64,
34p
Contract DA36 039AMC03634E

Unclassified report

Descriptors: (*Aluminum compounds, Oxides), (*Ceramic materials, Machining), Hydrogen compounds, Fluorides, Penetration, Machine tools, Lathes, Degradation, Heat treatment, Porosity, Recrystallization, Stability, Fluorination, Management engineering.

The report contains a general discussion of the purposes of the demonstration to machine high purity polycrystalline alumina by prior treatment with HF. It then goes into the investigations of samples of three known manufacturers of high purity polycrystalline alumina. The investigation covers primarily two areas. The first is the rate of penetration of the acid into the alumina. The second area is the machine tool wear produced by turning the sample in a lathe. The report then goes into reconstitution firing temperatures and the problems which were evident at this stage. The report then covers dimensional stability of the treated alumina before and after the reconstitution. Also considered is the preparation of the area for the fluorination of the engineering phase pieces and some of the precautionary measures built into the area.

AD-609 964 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

Aeroject-General Corp., Sacramento, Calif.
A MATHEMATICAL MODEL TO PREDICT PERFORMANCE RELIABILITY OF A MANUFACTURED COMPONENT WITH MULTIPLE CRITICAL CHARACTERISTICS BY NONDESTRUCTIVE TESTING,
by Eberhard H. Baur. 4 Nov 64, 20p
AGC-9300-IS

Unclassified report

Descriptors: (*Reliability, Mathematical models), (*Quality control, Non-destructive testing), Mathematical prediction, Optimization, Performance (Engineering), Design, Specifications, Probability, Manufacturing methods.

A mathematical model was developed for the estimation of the reliability of delivered items. The model is based on a series of assumptions about probabilities in manufacture and quality control. Quality control inspection is assumed to be of a nondestructive type. The mathematical model also indicates the sensitivity of the reliability estimate with respect to changes of the probabilities in manufacture and quality control, and an optimization procedure for a reliability increase with respect to costs is outlined. Some considerations for establishing a confidence level for the reliability estimations are added. (Author)

AD-609 973 Div. 26, 15, 30
OTS Prices: HC $3.00/MF $0.75

California Univ., Los Angeles Graduate School of Business Administration.
THE STRUCTURE OF PRODUCTION AND PROCESSING SYSTEMS.
Working paper and Research rept.,
by Richard V. Evans. Dec 64, 65p WMSI-WP-56, MSRP-RR-90
Contract Nonr23373, Task NR047 003

Unclassified report

Descriptors: (*Operations research, Production), (*Management planning, Production), (*Data processing systems, Theory), Queueing theory, Distribution, Networks, Production control, Processing, Stochastic processes, Scheduling, Mathematical models.

Problems of developing a general theory of production and processing systems are considered. Various types of measures of system characteristics are considered as a basis for classification. (Author)

AD-610 041 Div. 26, 15
OTS Prices: HC $2.00/MF $0.50

Rutgers Univ., New Brunswick, N. J.
A GENERAL FAMILY OF CHAIN SAMPLING INSPECTION PLANS.
Technical rept. no. N-20,
by Harold F. Dodge and Kenneth S. Stephens.
30 Dec 64, 38p
Contract Nonr40418, Projs. RR003 05 01, NR042 241

Unclassified report

Descriptors: (*Quality control, Statistical analysis), (*Statistical analysis, Quality control), (*Sampling, Quality control), Decision making, Production control, Stochastic processes, Production, Probability, Matrix algebra.

This report proposes a general family of chain sampling inspection plans based on certain concepts incorporated in the 'chain sampling inspection plans' designated ChSP-1, published by Dodge (1955). A basic feature is the utilization of cumulative results for decision making, intended primarily for use when samples are small. Giving special attention to what is referred to as a general family of 'two stage' chain sampling plans for use in lot-by-lot inspections, the report develops the theory for and evaluates the statistical properties of that particular set of such plans that is characterized by acceptance numbers (cumulative results criteria, CRC) of C1 = 0 and C2 =1. The cumulation of results is restarted after each lot rejection, proceeds in two steps, but extends to and continues with a maximum of only k samples. Tabulated values (and some charts) are given for the OC curves for a collection of plans in which: (1) the size of sample from each lot, n, is 3,5,8,10,15, and 20; and (2) the maximum number of samples for cumulation, k varies from 2 to 10. (Author)

AD-610 058 Div. 26
OTS Prices: HC $1.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
THE APPLICATION OF ULTRASONICS TO WIRE DRAWING.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64,
by A. T. Robinson, J. C. Connelly, and L. M. Stayton.
Nov 64, 25p NOTS-TP-3675, NOTS-TPR-382

Unclassified report

Rept. includes an appendix, 'The Application of Ultrasonic Energy to Metal Wire Drawing,' by Allen T. Robinson, which was presented at the National Wire Association Convention held in San Francisco, Calif. 13 Oct 64.

Descriptors: (*Drawing (Machine processing), Ultrasonic radiation), (*Ultrasonic radiation, Drawing (Machine processing)), (*Wire, Drawing (Machine processing)), Creep, Deformation, Metals, Machine tools.

A new wire drawing installation has been designed which will accommodate continuous draws and permit a range of draw rates from 2.0 to 700 feet/minute. A paper 'The Application of Ultrasonic Energy to Metal Wire Drawing' is included in this report as an appendix.

AD-610 069 Div. 26, 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
A METHOD FOR ELECTROCUTTING SINGLE CRYSTALS OF METALS AND ELECTROPOLISHING THE EXPOSED CRYSTALLINE FACE.
Instrumentation papers,
by Bernard Rubin and John J. O'Connor. Dec 64,
14p AFCRL64-957, AFCRL-IP-53
Proj. 5620

Unclassified report

Descriptors: (*Single crystals, Material removal), (*Electroerosive machining, Single crystals), (*Electrolytic polishing, Single crystals), Crystals, Copper, Electrolytes, Copper compounds, Hydrogen compounds, Phosphate, Surfaces, Epitoxial growth.

In order to minimize the introduction of physical defects into soft crystals during cutting or slicing operations, a technique has been developed for electrocutting and electropolishing ingots where electrochemical dissolution is used. Copper crystals were masked to expose the area to be cut

and, using an electrolyte of copper dihydrogen phosphate, anodic dissolution exposed the desired surface. The resulting surface was electropolished in order to expose the desired face for later use as an epitaxial substrate. (Author)

AD-610 081 Div. 26, 17, 27
OTS Prices: HC $3.00/MF $0.50

Budd Co., Philadelphia, Pa.
MANUFACTURE AND HYDROTEST OF THREE 20 INCH DIAMETER MAR-AGING STEEL PRESSURE VESSELS,
Final technical rept. for 16 May 63-16 Oct 64,
by W. J. Hauck. 16 Oct 64, 52p
Contract DA36 034ORD3296, Proj. OMS5010 1180800 51 03
Unclassified report

Descriptors: (*Pressure vessels, Maraging steels), (*Maraging steels, Pressure vessels), Nickel alloys, Titanium alloys, Molybdenum alloys, Carbon alloys, Welding, Heat treatment, Aging (Materials), Deformation, Tensile properties, Rocket cases, Cylindrical bodies, Fracture (Mechanics).

The fabrication of three pressure vessels and the hydrotest of two confirms the validity of the design concept and the material selected. The use of 18% nickel mar-aging steel strip at a yield strength approaching 300,000 psi is possible in a rocket case. Test results indicate that the processing techniques are practical and that consistency can be obtained. Simplicity of fabrication and heat treatment should be a favorable economic result even though the basic material cost of the mar-aging steel is somewhat higher than the lower alloy steels currently used in rocket motors. It is believed that utilizing the full properties available in the mar-aging steel and the processing techniques developed, that tensile strengths substantially in excess of 300,000 psi are feasible for metal rocket cases. (Author)

AD-610 098 Div. 26
OTS Prices: HC $2.00/MF $0.50

American Meteorological Society, Boston, Mass.
THE CONTINUOUS ZONE-REFINING METHOD,
by K. M. Rozin, V. N. Vigdorovich, and A. N. Krestovnikov. Jul 64, 33p AmMetSoc-T-R-439
Contract AF19 628 3880
TT 65 60831
Unclassified report

Metod Nepreryvnoi Zonnoi Perekristallizatsii, trans. of Akademiya Nauk SSSR. Otdelenie Tekhnicheskikh Nauk. Izvestiya: Metallurgiya i Toplivo, 1961, no. 6, p. 56-73.

Descriptors: (*Refining (Metallurgy), Zone melting), (*Zone melting), Refining (Metallurgy), Separation, Impurities, Crystallization, Melting, Deformation, Refining (Metallurgy), Analysis, USSR, Heaters, Semiconductors.

A continuous zone-refining method was developed which is marked by effective separation of the components and high productivity, accomplished by diluting the molten zone in the last section of the separating part of the column with simultaneous tapping of the molten zone at the end of each pass. The separation mechanism of continuous zone refining was studied with an apparatus designed for that purpose. Further, several basic designs of continuous zone-refining apparatus were made.

AD-610 135 Div. 26, 15, 30
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles. Graduate School of Business Administration.
CAPACITY OF QUEUING NETWORKS.
Working paper and Research rept.,
by Richard V. Evans. Jan 65, 15p WMSI-WP-62, MSRP-RR-92
Contract Nonr23373, Proj. NR047 003
Unclassified report

Supported in part by a Ford Foundation grant.

Descriptors: (*Queueing theory, Operations research), (*Operations research, Queueing theory), (*Statistical processes, Queueing theory), Probability, Networks, Optimization, Management planning, Scheduling, Measure theory, Equations.

The equivalence of two concepts of the capacity is developed. Capacity is the limiting load ratio (arrival rate measured in service rate units) for stable behavior. It is also defined as the expected output rate of the system operated under a saturation load. Additional information is obtained about the behavior of a specific example previously considered by the author. (Author)

AD-610 148 Div. 26, 7
OTS Prices: HC $6.00/MF $1.25

IBM Data Systems Div., Kinston, N. Y.
PERCUSSIVE WELDING STUDY II.
Terminal rept. (Final).
30 Nov 64, 228p
Contract N163 11815FBM
Unclassified report

Technical rept. on Welding Development.

Descriptors: (*Welding, Electric terminals), (*Electric terminals, Welding), Electric wire, Electric cables, Welds, Automatic, Aluminum, Maintainability.

This report evaluates various approaches to percussive welding. Included are: terminal end welding, stranded wire welding, automatic welding head development, aluminum wire and terminal study, and study of repairability problems involved in percussive welding.

AD-610 213 Div. 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
SOME POSSIBLE PITFALLS IN THE DESIGN AND USE OF PERT NETWORKING,
by L. S. Hill. Jan 65, 11p P-3038
Unclassified report

Descriptors: (*Management control systems, Costs), Management planning, Scheduling, Correlation techniques, Systems engineering, Operations research, Effectiveness.

After a new management technique has been in use for some time, a body of critical literature appears which serves as a catalyst to the refinement and increased application of the technique; for example, consider the fields of motion and time study and standard cost accounting. In the case of the PERT system, for some reason or other, such a collection of introspective documentation has been slow in coming. The present article was prepared with the hope that it will contribute toward the evolutionary development and use of the PERT technique. The paper is intended to be diagnostic rather than prescriptive. (Author)

AD-610 278 Div. 26, 7, 13
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ENERGY RESERVES OF AN INDUSTRIAL COMPLEX,
by V. G. Grigorov. 23 Dec 64, 5p
FTD-TT-64-1053
TT 65 60984

Unclassified report

Unedited rough draft trans. of Promyshlennaya Energetika (USSR) 1964, v. 19, no. 1, p. 42-43.

Descriptors: (*Industrial plants, Power supplies), (*Power supplies, Energy management), (*Energy management, USSR).

Examples are given of cases involving the inefficient allotment of power supplies from a common source to the individual enterprises of an industrial complex. Such situations are attributed to the lack of an authority dealing with the power ties within a complex.

AD-610 280 Div. 26, 17
OTS Prices: HC $2.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
U.S. GOVERNMENT METALWORKING PROCESSES AND EQUIPMENT PROGRAM.
Semiannual status rept., no. 2, Apr-Nov 64,
by Frank C. Holden and Francis W. Boulger.
23 Nov 64, 50p DMIC-209
Contract AF33 615 1121, Proj. 8975

Unclassified report

See also AD-600 088.

Descriptors: (*Material forming, Metals), (*Bibliographies, Material forming), Deformation, Fracture (Mechanics), Beryllium, Tungsten, Molybdenum, Tantalum, Niobium, Single crystals, Alloys, Strain (Mechanics), Heat treatment, Mechanical properties, High-pressure research, Extrusion, Hydrostatic pressure, Steel, Titanium alloys, Forging, Drawing (Machine processing), Ultrasonic radiation, Grain structures (Metallurgy), Magnesium alloys, Friction, Wear resistance, Surface properties, Plasticity, Rolling (Metallurgy), Metallic crystals, United States Government, Reports.

Information is presented in the form of topical discussions, which are intended to present a summary of the progress in each subject area. The topics selected for this report include the following: (1) Deformation and fracture (2) Strain rate and temperature effects (3) High-pressure studies (4) Ultrasonic effects (5) Orientation and texture studies (6) Grain-size effects (7) Friction, wear, and surface-effect studies (8) Mechanics of processing (9) Superplasticity; (10) Metalworking process development.

AD-610 284 Div. 26
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NETWORK APPROACH TO PARTS PROVISIONING: A SUMMARY DESCRIPTION,
by R. B. S. Brooks and R. H. Haase. Jan 65,
5p P-3053

Unclassified report

Summary of the presentation given at the Depot Scheduling and Control Conference held on 1-3 December 1964 at the RAND Corp., Santa Monica, Calif.

Descriptors: (*Replacement theory, Monte Carlo method), (*Management engineering, Replacement theory), Inventory control, Scheduling, Management control systems, Mathematical models, Computers, Operations research.

A Monte-Carlo computer model for evaluating different replacement-parts policies in a project context is developed. The input to the model consists of a description of the schedule of operations in PERT network form, a list of parts, and a list of 'possible demands'. Each part is characterized by the quantity stocked and the time required to repair a defective part, (this time can alternatively be interpreted as a reorder time for the part.) Each possible demand is characterized by where in the network the demand can occur, where it must be satisfied, which part is demanded, and the probability of occurrence. The output is a frequency distribution of the event times for each node in the network (i.e. distributions of the earliest time that each operation can be started).

AD-610 285 Div. 26, 1, 12
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PLANNED REPLACEMENT,
by Chauncey F. Bell and Milton Kamins. Jan 65,
10p P-3052

Unclassified report

Prepared for publication in Missiles and Rockets Magazine.

Descriptors: (*Replacement theory, Scheduling), (*Scheduling, Replacement theory), (*Management engineering, Replacement theory), Inventory control, Maintenance, Aircraft, Guided missiles.

This is a brief description of a continuing RAND research effort which is believed to have potential usefulness to commercial and military users of aircraft or missiles. The major purposes of a policy of scheduled or planned replacement for selected components in aircraft or missiles are: increased safety, improved reliability, and where possible, greater economy. The objective of the study is to learn something about the characteristics of a planned replacement policy, so that it is possible to determine when and how to apply it for the most desirable results.

AD-610 291 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANALYSIS OF CONDITION RELATED TO HIGH-TEMPERATURE DEFORMATION OF HIGH-MELTING METALS.
by V. L. Orzhekhovskii, I. M. Pavlov, and Ya. B. Gurevich. 9 Jan 65, 9p FTD-TT-64-595
TT 65 61003

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Chernaya Metallurgiya (USSR) 1963, v. 6, no. 9, p. 88-91.

Descriptors: (*Refractory metals, Rolling (Metallurgy)), (*Rolling (Metallurgy), Refractory metals), (*Deformation, Refractory metals), Molybdenum, Niobium, Titanium, Vacuum apparatus, Controlled atmospheres, Argon, Pressure, High-temperature research, Hardness, Plasticity, USSR.

An investigation was made of the high-temperature deformation of some high-melting metals in order to learn

about the conditions of their processing by pressure. The researches were conducted on a laboratory vacuum unit which enabled one to heat, roll, and cool metal in a vacuum (up to .00001 on the Hg column), an atmosphere of protecting gas (argon) and the air. The rolling was done on a duo mill at the rate of about 6 m/min. Rollers of the diameter of 85 mm were prepared out of XhKh 15 steel (hardness HV = 450--500 kg/sq mm). In the course of the process there were measured the overall pressure of the metal on the rollers, the speed of the rollers, and the rate of the output of the strip. There were rolled in the rolling-mill way pure molybdenum and niobium with relative reductions respectively of 25 and 20% in the interval of 1,000--1,250C. Parallelly there was rolled technically (as in industry) pure titanium of the brand VT1 with relative reduction of 30% in the interval of 800--1,200C.

AD-610 293 Div. 26, 17
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF THERMOMECHANICAL TREATMENT ON SUSCEPTIBILITY TO TEMPERING BRITTLENESS,
by L. G. Sakvarelidze and F. N. Tavadze.
31 Dec 64, 12p FTD-TT-64-609
TT 65 61005

Unclassified report

Unedited rough draft trans of Akademiya Nauk Gruzinskoi SSR, Tiflis. Institut Metallurgii. Trudy, 1962, v. 12, p. 159-165.

Descriptors: (*Steel, Brittleness), (*Mechanical working, Steel), (*Brittleness, Steel), Heat treatment, Carbon alloys, Grain boundaries, Hardening, Forging, Austenite, Microstructure, Carbides, Martensite, USSR, Impact shock, Phase studies, Transition temperature, Metallography.

Results are given about the positive effect of thermomechanical treatment on the susceptibility of steel to reverse tempering brittleness. As was later explained, individually and apparently somewhat ahead of us, to an analogous conclusion has also arrived V. D. Sadovskiy and co-workers (1, 2). These investigations included basically, data about impact tenacity. Investigations, connected with structural cause of thermomechanical treatment effect, have not been published. An investigation, together with studying the thermomechanical treatment effect on the magnitude of impact tenacity, was made of the microstructure of steel obtained as result of hardening from forging (rolling) heating.

AD-610 316 Div. 26, 17
OTS Prices: HC $3.00/MF $0.75

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE.
Final rept.,
by E. A. Murphy and R. G. O'Rourke. 7 Dec 64, 58p
BBC-TR-382-243
Contract NOw64 0162c

Unclassified report

Descriptors: (*Beryllium alloys, Wire), (*Wire, Beryllium alloys), (*Drawing (Machine processing), Beryllium alloys), Iron alloys, Copper alloys, Powder alloys, Beryllium compounds, Oxides, Deformation, Temperature, Extrusion, Hardening, Grain structures (Metallurgy), Tensile properties, Ductility, Microstructure, X-ray diffraction analysis.

The beryllium-iron alloys could not be deformed at temperatures used for the warm drawing technique. It was found that the 2% copper level gives improved mechanical properties to extruded forms over the 5% copper level. Both copper beryllium alloys showed very poor strain hardening characteristics during the warm drawing operation. The drawability of the fine grained materials from the same starting material was found to decrease with decreased grain size with increased oxide content. A 15% increase in tensile strength with a substantial increase in wire ductility at 0.00477-inch diameter was shown for wire, as-drawn from 0.210-inch diameter, from starting material having -20 +10 micron particle size. Similar strength levels with excellent ductility were obtained with high purity -15 +1 electrorefined material at wire sizes of 0.001278-inch diameter. A 25% increase in tensile strength was obtained after pickling. The data suggest that the optimum tensile strength for wrought beryllium wire would occur at some narrow fractional cut with the minimum particle size well over 1 micron at a high purity level. This would permit maximum work hardenability while still retaining grain size control. (Author)

AD-610 343 Div. 26, 4, 14
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE CELLULAR STRUCTURE OF THICK-LAYERED ANODIC OXIDE FILMS,
by N. D. Tomashov and F. P. Zalivalov. 9 Jan 65, 13p FTD-TT-64-598
TT 65 61016

Unclassified report

Unedited rough draft trans. of mono. Korroziya Metallov i Splavov: Sbornik (Corrosion of Metals and Alloys: Collection) Moscow, 1963, p. 194-202.

Descriptors: (*Aluminum, Protective treatments), (*Oxides, Films), (*Films, Molecular structures), (*Anodes (Electrolytic cells), Films)), Electrolytes, Temperature, Electrolysis, Thickness, Electric currents, Voltage, USSR, Aluminum compounds, Coatings.

The purpose of the report was in the determination of the quantitative interconnection between the thickness of the barrier layer of oxide film and the dimensions of the oxide cells. For objects of research there were chosen specimens of aluminum of AVOOO (99.99% Al) which were then anodically oxidized (anodized) in 4-n H_2SO_4 with current densities of 2.5, 5, and 10 amp/dm squared and the shaping voltages corresponding to them (E) 22, 25, and 27 v. The temperature of the electrolyte during the anodizing was maintained at about -- 2. The dimensions of the oxide cells are determined from photographs obtained with the electron microscope EM-3 with the aid of collodion and carbon replicas. The thickness of the barrier layer of the anodic film was determined by the electrochemical method, based on the measurement of the dependence, voltage-amperage in alkalized 3- percent solution of tartaric acid (pH = 5.5) in which the rate of the growth of the barrier is equal to 14 A/v. In accordance with these data the thickness of the barrier layer is equal to the fourteenfold maximum terminal voltage of the circuit in volts at which the current does not rise sharply. The latter is observed at the rise above the voltage at which there was formed the given barrier layer.

27. Propulsion Systems

AD-610 179 Div. 27
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EFFECT OF CHAMBER PRESSURE ON THE PERFORMANCE OF A SMALL REVERSE-FLOW ROCKET ENGINE.
Master's thesis,
by John Clark Vaughan, III. 1964, 96p GA/ME/64-8
Unclassified report

Descriptors: (*Rocket motors, Combustion chambers), (*Combustion chambers, Pressure), Thrust, Gaseous rocket propellants, Hydrogen, Oxygen, Fuel injectors, Combustion, Thermal properties, Rocket motor nozzles, Thermal insulation, Coatings.

Experimental tests were made on a small reverse-flow rocket engine utilizing gaseous hydrogen and oxygen as propellants. The engine was operated at chamber pressures from 50 to 150 psia and developed thrusts from 40 to 150 pounds. The majority of tests were conducted at chamber pressures of 60 and 100 psia. Results indicated that the same maximum characteristic exhaust velocity (7960 fps) and combustion efficiency (97%) were obtained for both these chamber pressures. However, with increasing chamber pressure the optimum mixture ratio increased. In addition, it was found that the best combustion chamber shape was spherical. (Author)

AD-610 327 Div. 27, 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
INVESTIGATION OF A CYCLONE SEPARATOR IN A NATURAL-CIRCULATION SYSTEM,
by B. A. Dement'ev, A. A. Loginov, and V. M. Ryabov.
20 Jan 65, 14p FTD-TT-64-683
TT 65 61043
Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) 1961, v. 8, no. 5, p. 52-57.

Descriptors: (*Steam, Separation), (*Particles, Separation), (*Gases, Separation), USSR, Moisture, Steam power plants, Boilers.

The results of investigations in the determining of the moisture of stream at the outlet of a cyclone machine as depends on the steam load in the interval of pressure 9--33 abs. atm. are presented. An empirical formula is derived for determining the moisture of the steam issuing from the cyclone of the design under consideration. The data of the experiments are compared with precipitation separation of steam in volume. There is brought out the dependence of the resistances of the separate sections of the cyclone on the load at different pressures. (Author)

28. Psychology and Human Engineering

AD-609 983 Div. 28
OTS Prices: HC $3.00/MF $0.75

Illinois Univ., Urbana.
A CONTENT-ANALYTIC METHOD FOR STUDYING INTERPERSONAL BEHAVIOR AND A STUDY OF VERBAL AND NONVERBAL BEHAVIORS ASSOCIATED WITH SOCIAL ROLES.
Technical rept. nos. 19 and 20,
by Evelyn Walker Katz. Nov 64, 71p
Contract Nonr183436, Proj. NR177 472

Unclassified report

Descriptors: (*Social psychology, Behavior), (*Culture, Social psychology), (*Verbal behavior, Social communication), Group dynamics, Language, Attitudes, Motivation, Word association, Sociometrics, Psychometrics.

In the first study, a method of content analysis suitable for handling complex social interaction encountered in short stories was developed. The interactions were analyzed in terms of a motivational organizing principle. The manifest content was translated on the basis of the inferred intention or purpose of the Actor with respect to the Object. The unit of analysis is ACO (Actor-Connector-Object) where the Actor is the source of the interaction; the Object is the person toward whom the action is directed; and the Connector is the literal material (manifest content) on which the interaction is based, defined as a verb form which involves actions or fellings. Each Actor was coded according to his social role relationship to the Object. This permitted the classification of persons in terms of interpersonal situations, with a minimum regard for personal attributes. The purpose of the second study in the report was to develop measurement instruments which could be applied to the study of perceived cultural differences in role behaviors. Role behaviors for the American culture were derived from a content analysis of short stories, which analyzed social interactions according to role-pairs. The results of the content analysis were analyzed to yield the most frequent behaviors and the most frequent role-pairs.

AD-609 992 Div. 28
OTS Prices: HC $2.00/MF $0.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
FORM PERCEPTION IN VIDEO VIEWING: EFFECTS OF FORM CONTENT AND STEREO ON RECOGNITION.
Final rept.,
by Larry W. Paine. Sep 64, 38p AIL-9674
Contract AF19 628 328, Proj. 9674, Task 967402
ESD TDR64 666

Unclassified report

See also AD-401 654.

Descriptors: (*Geometric forms, Space perception), (*Space perception, Geometric forms), (*Television display systems, Perception), (*Perception, Geometric forms), Perception (Psychology), Vision, Images, Degradation, Stereoscopic display systems, Resolution, Thresholds (Physiology).

Recognition values, under varying levels of image degradation, were determined for randomly constructed objects of varying complexity (contour turns) and for familiar geometric objects. Values for both familiar and unfamiliar objects were significantly affected by image degradation, but were unaffected by using stereo viewing as compared with nonstereo viewing under the conditions of these experiments. Variations in the effective inter-objective distance between stereo images had no significant effect on recognition values. (Author)

AD-610 026 Div. 28
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE BUCK STOPS NOT.
Professional papery,
by Joseph Fink. 30 Oct 64, 20p SP-1854

Unclassified report

Descriptors: (*Decision making, Reasoning), (*Reasoning, Decision making), Real time, Air Defense Command, Aircraft defense systems, Defense systems.

A review is given of decision making behavior in the environment of a real-time air defense system. Man's place in such systems is discussed and are that rationale on which one allocates functions (decisions) between men and machines and decision avoidance behavior. In the general theory of bureaucracy, not making a decision is regarded as never being as dangerous to a man's position as making a wrong decision. The conclusion is that it may be said that the way to get ahead is to make only those decisions which superiors ir the organization have already approved. This material represents reflections on a presentation made to the Human Factors Work Group at the 12th Military Operations Research Symposium, held at the U. S. Air Force Academy, Colorado Springs, Colo., on Oct. 22-24, 1963.

AD-610 075 Div. 28
OTS Prices: HC $1.00/MF $0.50

Hunter Coll. of the City Univ. of New York.
THE EFFECTS OF PERSUASIVE COMMUNICATIONS ON ATTITUDES.
Annual rept. no. 1,
by Walter Weiss. 1964, 12p
Contract Nonr430900

Unclassified report

Descriptors: (*Attitudes, Social psychology), (*Social communication, Attitudes), Psychometrics, Group dynamics, Public opinion, Perception (Psychology), Reasoning, Factor analysis, Correlation techniques.

The major focus of research was on the role of the communicator in communication effectiveness. Several studies were experimental investigations of various aspects of source effects, and one involved factor analyses of differentiating attributes assigned to a variety of sources. In addition, two studies on other matters related to attitudes and attitude change were carried out.

AD-610 121 Div. 28, 30
OTS Prices: HC $2.00/MF $0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
CORTEX: A COMPUTER-BASED SYSTEM FOR AIDING DECISION MAKING,
by Emir H. Shuford. Dec 64, 43p
ESD-TR-64-677
Proj. 4690, Task 469003

Unclassified report

Pub. in Information System Sciences: Proceedings of the Second Congress, Spartan Books, Inc., Washington, D. C., 1965

Descriptors: (*Decision making, Theory), (*Computers, Decision making), Computers, Real time, Statistical analysis, Data processing systems, Programming (Computers), Probability, Distribution, Cathode ray tubes, Decision theory.

Decision theory is the contemporary manifestation of the mathematics of the decision process and thus can be viewed as a primary aid to the human decision process. The costs and gains of applying the concepts and algorithms of decision theory are considered in some detail. A man/computer system is described which is designed to make the concepts and algorithms of decision theory available to a decision maker at a greatly reduced personal cost. This is achieved, in large part, by significantly reducing the special knowledge required of the decision maker. Thus, the decision maker needs no knowledge of computer programming and a minimal knowledge of decision theory and mathematics in order to begin using the system in his day-to-day decision making activities. (Author)

AD-610 122 Div. 28, 18, 30
OTS Prices: HC $2.00/MF $0.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
THE MODIFIABILITY OF DECISIONS MADE IN A CHANGING ENVIRONMENT,
by Richard S. Gibson and Elizabeth H. Nicol.
Dec 64, 40p ESD-TR-64-657
Proj. 7682, Task 768203
Unclassified report

See also AD-600 441.

Descriptors: (*Decision making, Communication theory), Military psychology, Probability, Command and control systems, Psychometrics.

This research is concerned with the question of whether a decision maker's sensitivity to incoming information undergoes any change after he has reached a decision. A dynamic decision task, embedded in a limited war context, was presented to the subject who was required to assess simulated reconnaissance reports and to estimate the location of the enemy's main force. After a certain number of trials in which the information samples pointed to one of the alternative locations, the subject was then presented with a growing body of contraindicative information. An experimental study of the factors influencing decision modification was designed to test the effect of three main variables: (1) nature of the original condition, (2) length of time over which expectations were built up, and (3) amount of change represented in the shift from the initial condition to the post-decision situation. Twelve subjects were tested individually in a series of six periods. The facility with which subjects modified their decisions was inversely related to the amount of situational change and the amount of experience in the situation before a change was introduced. The results indicated also that more information is required to change a decision than is originally needed to make the decision. Comparison of the subjects' performance scores with those of an 'ideal Bayesian observer' showed highly significant correlations.

AD-610 210 Div. 28, 1, 23, 30
OTS Prices: HC $3.00/MF $0.75

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A FACTOR ANALYTIC APPROACH TO HUMAN ENGINEERING ANALYSIS AND PREDICTION OF SYSTEM MAINTAINABILITY.
Final rept. for Jan-Jun 64,
by Donald A. Topmiller. Dec 64, 88p
AMRL-TR64 115
Proj. 7184, Task 718406
Unclassified report

Descriptors: (*Human engineering, Maintenance personnel), (*Factor analysis, Human engineering), (*Maintenance personnel, Human engineering), (*Systems engineering, Maintenance personnel), Air force equipment, Aircraft equipment, Maintenance, Maintenance equipment, Maintainability, Management engineering, Mathematical analysis, Effectiveness.

The study is introduced by reviewing previous attempts to quantify and predict systems maintainability. A theoretical formulation is outlined which treats the measurement and prediction of system maintainability as a 'components-of-variance' model. The sources of variance are identified as: inter and intra man (personnel and social variables); machine (weight, volume, reliability, etc.) and man-machine interaction (human engineering design criteria). A restricted case of the formulation was investigated empirically in an attempt to predict maintainability of a sample of Air Force equipment from a questionnaire evaluation of the human engineering design features. Questionnaire responses, factor-analyzed by the Wherry-Winer Method, yielded eight orthogonal (independent) maintainability design factors. On the basis of the obtained factor loadings, seven of the original eight factors were selected as the most potent predictors. Several regression analyses were performed using different assumptions concerning both heterogeneity of sampled equipment and questionnaire scale stability. Coefficients of determination ranged from .27 to .47 depending on the assumptions made. Generally it was found that predictive efficiency increased and factor validity patterns changed when equipment was classified to make more homogeneous sets (Author)

AD-610 212 Div. 28, 18, 26, 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE VALUE OF UNCHOSEN ALTERNATIVES,
by Anthony Downs. Nov 64, 9p P-3017
Unclassified report

Prepared in cooperation with Real Estate Research Corp., Chicago.

Descriptors: (*Decision theory, Applied psychology), (*Bargaining, Decision making), Game theory, Operations research, Economics, Social psychology.

29. Quartermaster Equipment and Supplies

No Entries

30. Research and Research Equipment

AD-609 897 Div. 30, 17
OTS Prices: HC $1.00/MF $0.50

Watertown Arsenal Labs., Mass.
ULTRASONIC ATTENUATION AND PHYSICAL PROPERTIES OF METALS.
Monograph series,
by John W. Orner. Nov 60, 13p
WAL MS20

Unclassified report

Presented at International Conference on Nondestructive Testing (3rd) sponsored by the Science Council of Japan, Osaka, 21 Mar 60.

Descriptors: (*Metals, Non-destructive testing), (*Non-destructive testing, Ultrasonic radiation), (*Ultrasonic radiation, Metals), Attenuation, Microstructure, Physical properties, Solids, Energy, Absorption, Test methods.

Progress is reported in the investigation of ultrasonic attenuation or rate of energy absorption in a solid material. As the mechanism of attenuation is becoming better understood, a very valuable nondestructive testing tool is being made available for the determination of physical properties of metals.

AD-609 922 Div. 30, 26
OTS Prices: HC $4.00/MF $1.00

General Technology Corp., Elgin, Ill.
AN INVESTIGATION OF LOADS, STRESS LEVELS, AND FRICTION TORQUES OF TIMER-MECHANISM BEARINGS,
by Martin Senator. Aug 64, 144p TRX-3
Contract DA11 022AMC168A

Unclassified report

Descriptors: (*Timing devices, Bearings), (*Bearings, Timing devices), (*Mechanical engineering, Bearings), Journal bearings, Jewel bearings, Clocks, Acceleration, Loading (Mechanics), Stresses, Friction, Torque, Mechanics, Instrumentation.

The purpose of this investigation is to analyze the effects of axial and transverse acceleration on bearings of various shapes which may be suitable for use in spring driven timer mechanisms. The investigation considers the feasibility of each bearing in terms of loads, stress levels, and friction torques and indicates appropriate design and analysis techniques. Bearings which can withstand axial load are analyzed. Ten different combinations of shape and pressure distribution are considered. Formulas are derived in each case expressing the required bearing size as a function of its pertinent geometric parameters and the dimensionless axial load. Bearings are analyzed under transverse load. Journal bearings are investigated. An approximate method is developed for calculating contact stresses in terms of transverse load, bearing size, and meridian radius of curvature. In addition expressions for friction torque are developed. Typical loading is considered and numerical values are calculated for this loading. The estimation of typical loading and the investigation of the feasibility, for this application, of sharp vee-jewel bearings as used in precision instruments and watches are also discussed.

AD-609 972 Div. 30
OTS Prices: HC $2.00/MF $0.50

Mississippi State Univ., State College.
A DEVICE FOR REMOTELY DETERMINING THE INITIAL ACCELERATION OF VEHICLES.
Aerophysics research note no. 22,
by J. J. Cornish, III and S. C. Roberts. Nov 64, 28p
Contract DA44 177AMC892T, Task 1D121401A14203
TRECOM TR64 58

Unclassified report

Descriptors: (*Accelerometers, Remote control systems), Vehicles, Aircraft, Acceleration, Measurement, Dacron, Cordage, Rotation, Cylindrical bodies, Timing devices, Recording systems, Calculus of variations, Instrumentation.

A device is described which enables the initial acceleration of vehicles from zero velocity to be easily determined. Essentially, the device consists of a pre-stretched cord, which is attached to the vehicle and which is unreeled from a rotating drum as the vehicle moves, and a timing and recording mechanism which displays a chart of the vehicles linear displacement as a function of time. Several examples are presented and the methods for reducing the data are given. (Author)

AD-609 977 Div. 30, 25
OTS Prices: HC $3.00/MF $0.75

Princeton Univ., N. J.
THERMODYNAMIC METHODS OF HIGH-TEMPERATURE MEASUREMENT.
Interim technical rept.,
by J. Grey. Oct 64, 64p
Contract AF33 657 9962, Proj. 7063, Task 706303
ARL 64 179

Unclassified report

Descriptors: (*Temperature, Measurement), (*Enthalpy, Measurement), (*High-temperature research, Instrumentation), Thermodynamics, Test methods, Pneumatic devices, Gas flow, Plasma medium, Heat transfer, Gages, Calorimeters, Ablation, Mathematical analysis.

Thermodynamic temperature measurement techniques fall into three separate classes: pneumatic devices, heat-transfer gages, and calorimetric methods. All three are characterized by the ability to measure temperatures (or related fluid properties such as enthalpy) at levels beyond the capability of thermoelectric materials or pyrometer calibration devices. This report reviews the principle of operation, present status, range of applicability, and performance of each of these thermodynamic temperature and enthalpy-measuring techniques. In many instances, particularly when opaque gases or high temperature gradients are present, the thermodynamic probes represent the only suitable method for measurement of extremely high gas enthalpies and temperatures.

AD-609 980 Div. 30, 8, 15, 25
OTS Prices: HC $4.00/MF $1.00

Laboratory for Electroscience Research, New York Univ., N. Y.
THE GENERAL THEORY OF DIGITAL FILTERS WITH APPLICATIONS TO SPECTRAL ANALYSIS,
by Kenneth Steiglitz. May 63, 121p
NYU TR-400-99
Contract AF49 638 586; Grant AF AFOSR62 321
AFOSR 64 1664

Unclassified report

Descriptors: (*Filters (Electromagnetic wave), Theory), (*Integral transforms, Filters (Electromagnetic wave)), (*Digital computers, Communication theory), Signals, Optimization, Band-pass filters, Transformations (Mathematics), Digital systems, Analog systems, Analog computers, Complex variables, Fourier analysis, Bandwidth, Control systems, Algebra, Matrix algebra, Series, Functional analysis.

The filtering theories for both continuous-time and discrete-time signals are formulated in terms of abstract Hilbert space, with the notion of a stable filter defined as a bounded linear operator. A specific isomorphism is then constructed which connects the filtering theories for continuous-time and discrete-time signals, and in the linear time-invariant case the two theories are shown to be essentially identical. This means that many optimization problems can be solved simultaneously for continuous-time and digital systems. The isomorphism developed above is used to reduce the approximation problem for digital filters to that for continuous-time filters. The problem of estimating the power-spectral-density of a signal from equally spaced samples is discussed. It is shown that bandpass digital filters generate a class of spectral windows which produce always positive estimates of the power-spectral-density. The optimum bandwidth and shape of such a filter are then derived. A method for identifying unknown parameters in the power-spectral-density of a digital signal is presented.

AD-609 982 Div. 30, 8, 10
OTS Prices: HC $3.00/MF $0.75

Rohm and Haas Co., Huntsville, Ala.
APPLICATIONS OF MICROWAVES IN THE NON-DESTRUCTIVE TESTING OF SOLID PROPELLANTS,
by W. W. Brandon, Jr. 2 Nov 64, 59p Rohm-S-53
Contract DA01 021ORD12341Z
Unclassified report

Descriptors: (*Propellants, Non-destructive testing), (*Microwaves, Non-destructive testing), (*Solid rocket propellants, Non-destructive testing), (*Rocket propellant grains, Non-destructive testing), Aluminum, Powder metals, Configuration, Binders, Simulation, Signals, Attenuation, Standing-wave ratios, Polymerization, Antenna feeds, Attenuators, Surface properties.

Power employed was less than 0.1 watt at frequencies between 8 and 24 Gc. Results with dummy propellant formulations were evaluated in terms of signal attenuation. Attenuation in a polymer-filled waveguide decreased during polymerization by a factor of from 2 to 10 depending upon the material tested. Disregarding standing wave effects, which were pronounced and unpredictable, powdered aluminum (6.4 - 13. 0 microns dm) produced attenuation; at normal incidence to the signal path between horn antennas, attenuation increased by about 0.144 decibels per centimeter of propellant thickness per weight percent of aluminum. With the same arrangement, and propellant containing aluminum staple maximum attenuation was obtained when the staple length was an integral multiple of the half-wavelength of the signal in the propellant. Rotation of cubical test samples in the plane-polarized microwave beam showed effects of preferred staple orientation superimposed on effects of random orientation. Propellant-propellant interfaces between slabs produced detectable attenuation by reflection only at high angles of incidence with the electric field of the test signal perpendicular to the plane of incidence.

AD-609 991 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

RIAS, Inc., Baltimore, Md.
NOTES ON THE THEORY OF FINITE MACHINES,
by J. J. Florentin. Aug 64, 34p RIAS-TR-64-15
Contracts AF49 638 1206, NASw845
AFOSR 64 1787
Unclassified report

Descriptors: (*Algebra, Automata), (*Groups (Mathematics), Mapping (Transformations)), Set theory, Combinatorial analysis, Mathematical logic, Computer logic, Sequences, Digital computers, Computers, Theory, Control.

The purpose of the notes is to provide some background for the engineer who may have difficulty in reading the Krohn-Rhodes paper (Algebraic Theory of Machines) reproduced in the appendix. The notes present a summary of the new algebraic theory aimed at giving the engineer a broad understanding of the approach, but not claiming that effective design methods have yet been developed. No attempt has been made to make the notes definitive or complete; in all mathematical questions the Krohn-Rhodes paper should serve as the sole reference.

AD-609 996 Div. 30, 17
OTS Prices: HC $1.25/MF $0.50

Watertown Arsenal Labs., Mass.
IMPACT TESTING NO. I: CALIBRATION OF THE CHARPY IMPACT MACHINE AND PROCEDURE FOR INSPECTION AND TESTING OF CHARPY V-NOTCH IMPACT SPECIMENS.
by D. E. Driscoll. Nov 58, 46p
WAL 112/89 Rev; PB 161 864 canceled
Unclassified report

Descriptors: (*Impact shock, Test equipment), (*Test methods, Impact shock), Toughness, Calibration, Metals.

This document explains the Charpy V-notch impact test. The purpose and theory of the test, the design of both test machine and specimen, calibration of the machine, how to conduct the test, and the variables which affect results are described. Also included is the procedure to be followed by those wishing to have their machines certified as acceptable for Ordnance Corps inspection testing.

AD-610 023 Div. 30
OTS Prices: HC $3.00/MF $0.75

Office of Aerospace Research, Washington, D. C.
OAR QUARTERLY INDEX OF CURRENT RESEARCH RESULTS, 1 JULY-30 SEPTEMBER 1964.
30 Sep 64, 77p
Unclassified report

Descriptors: (*Indexes, Air force research), (*Air force research, Indexes), Bibliographies, Scientific research, Aeronautics, Physics, Medicine, Electronics, Propellents.

AD-610 049 Div. 30, 17, 20
OTS Prices: HC $2.00/MF $0.50

Watertown Arsenal Labs., Mass.
THE BI-AXIAL STRENGTH OF HEAT-TREATED ALLOY STEEL SHEETS AND WELDMENTS.
Monograph series,
by Donald A. Corrigan. Jul 62, 36p WAL MS-42
Unclassified report

Master's thesis at Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Tensile properties, Test methods), (*Mechanical properties, Test methods), (*Steel, Tensile properties), (*Welds, Tensile properties), Sheets, Alloys, Pressure vessels, Cylindrical bodies, Heat treatment, Creep, Loading (Mechanics), Aluminum alloys, Helium group gases, Tungsten, Metals.

This investigation deals with the development and application of a simple testing technique which measures the strength of metallic sheets and weldments under bi-axial loading conditions, simulating those found in a cylindrical pressure vessel. The test technique employed is a simply slotted sheet tensile specimen, which uses a large elastic bulk to restrain plastic flow in a direction perpendicular to that of the applied tensile load, thus creating a condition of plane strain. The following conclusions may be drawn: (1) A slotted sheet specimen may be used to create a condition of plane tensile strain and associated two-to-one bi-axial tensile loading in weldments and base metals. (2) The specimen offers the simplest method yet developed to measure the effects of bi-axial loading upon tensile strength. (3) Under conditions of two-to-one tensile loading, the strength of heat-treated alloy steel sheet and weldments is raised appreciably. (4) Tensile strength increases of greater than 10% are possible for both base metals and weldments, but the magnitude of this increase may be influenced by both strength level and weld quality.

AD-610 052 Div. 30, 22
OTS Prices: HC $5.00/MF $1.00

Naval Ordnance Lab., White Oak, Md.
PROGRAMMING FOR THE DIGITAL SIMULATOR AND COMPUTER (DISAC),
by C. Nicholas Pryor. 2 Sep 64, 157p
Task RUDC3B000F001 10 12
NOL TR64 119

Unclassified report

Descriptors: (*Programming (Computers), Digital computers), (*Digital computers, Simulation), (*Simulation, Digital computers), (*Weapon systems, Simulation), Real time, Transistors, Compilers.

DISAC is a transistorized digital computer for applications in real-time signal processing or simulation of weapon systems. This report describes the characteristics of the DISAC (Digital Simulator and Computer) system from the point of view of the programmer, and includes an introduction to programming of systems of this type. An assembler/compiler (DOPE) and an operating system (DOS) are described, and instructions are given for the use of these programs.

AD-610 062 Div. 30
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
MASKED SEARCH PROGRAM,
by G. S. Stoller. Jan 65, 29p Mitre-W-06614
Contract AF19 628 2390, Proj. 508 0
ESD TDR64 629

Unclassified report

Descriptors: (*Programming (Computers), Search theory), Computers, Computer storage devices, Errors.

The Masked Search Program is a static trace and can be used for debugging or modifying a 7090 program. The report describes the program and how it is used in most cases. Additional information is provided to cover unusual occurrences during the program run. (Author)

AD-610 095 Div. 30, 25
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON COMPUTER NEURISTOR DEVICES.
Final summary rept. for 1 Jun 60-1 Sep 64,
by Milton W. Green. 8 Jan 65, 13p
Contract Nonr321200, Projs. NR048 158, 3286

Unclassified report

See also AD-608 148.

Descriptors: (*Neuristors, Computer logic), (*Computer logic, Neuristors), (*Semiconductor devices, Computer logic), Superconductors, Circuits, Computers, Solid state physics, Reviews, Bibliographies.

This report outlines the historical development of the research activities, indicates the areas in which substantial progress was made, and describes some of the difficulties encountered in practical device realization. An annotated bibliography of formal reports and published technical papers that were submitted to the ONR during the interval covered by this contract is also included.

AD-610 100 Div. 30, 25
OTS Prices: HC $3.00/MF $0.75

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
DEVELOPMENT OF A QUADRUPOLE MASS SPECTROMETER.
Rept. for Jun 63-Nov 64,
by C. E. Woodward and C. K. Crawford. Dec 64, 59p LIR-TR-194
Contracts AF33 616 8353, AF33 657 10939,
Projs. 7371, 7360, Tasks 737101, 736004
ML TR64 400

Unclassified report

Descriptors: (*Mass spectroscopy, Spectrum analyzers), (*Spectrum analyzers, Mass spectroscopy), Circuits, Resolution, Radiofrequency, Ion beams, Ion sources, Voltage, Electron multipliers, Sweep generators, Electromagnetic lenses, Gain.

An electric quadrupole mass spectrometer has been developed to cover 1 to 400 amu in four ranges. The electronic circuits that supply voltages to the mass filter are capable of 50:1 spectral-range sweeps in 0.1 sec, but resolution over a wide sweep range is limited by nonlinearity in the control of the r-f voltage. Compensation reduces nonlinearity over a 10:1 sweep range from 4 to 0.4%. The electron-multiplier ion collector is operated as a particle detector to eliminate the effects of multiplier gain variations. High-speed circuits (resolving times < 5 x 10 to the minus 8th power sec) produce standard output pulses that are integrated in a linear ratemeter to determine the mean rate. Spectrometer resolution is limited by mechanical imperfections in the quadrupole lens: The highest observed value has been m/delta m = 300 measured at the 1% amplitude points. A fine structure on the mass lines is attributed to lens imperfections . (Author)

AD-610 109 Div. 30, 2
OTS Prices: HC $3.00/MF $0.75

Litton Systems, Inc., St. Paul, Minn.
SKYHOOK BALLOON FLIGHTS FLIN FLON, MANITOBA, CANADA: FLIGHTS 3006 N THRU 3013 N AND 3015 N AND 3016 N.
Rept. for 18 Aug-18 Sep 64,
by T. E. O'Malley and R. M. Dungan. 10 Dec 64, 73p

LSI-2650
Contract Nonr456700, Proj. 55053
Unclassified report

Descriptors: (*Meteorological balloons, Atmospheric sounding), (*Atmospheric sounding, Meteorological balloons), Gamma rays, Monitors, Antennas, Instrumentation, Stratosphere, Theoclolites, Upper atmosphere, Launching, Balloon equipment, Flight paths.

The report discusses the planning and execution of a series of balloon flights from Flin Flon, Manitoba, Canada, in August and September of 1964. A total of ten flights carrying gamma ray detectors and associated scientific and balloon control instrumentation were flown.

AD-610 145 Div. 30
OTS Prices: HC $1.00/MF $0.50

Mithras, Inc., Cambridge, Mass.
A NEW THERMAL DETECTOR.
Scientific rept. no. 5,
by Terence J. Wieting, Thomas R. Lawrence and Charles S. Naiman. Oct 64, 19p MC-62-49-R5
Contract AF19 628 2395, Proj. 5621, Task 562104
AFCRL 64 694
Unclassified report

Descriptors: (*Thermal radiation, Measurement), Magnetic materials, Magnetic properties, Oscillators, Frequency shift, Manganese compounds, Phosphides, Ferromagnetic materials, Semiconductors, Coils, Phase studies, Magnetic fields, Films, Ferrites, Transition temperature.

As part of a study of the dynamic properties of phase transition of ordered magnetic states, experiments have been performed that involve measuring the susceptibility of magnetic materials as the applied magnetic field is varied about a value for a critical phase transition to occur. This measurement technique has suggested a new thermal detector that, on the basis of preliminary calculations, promises to have an excellent NEP(10 to the minus 10 power - 10 to the minus 11 power) and whose output would be a frequency proportional to heat input. In addition this detector would provide; high level voltage output, output information rate approximately equal to the material time constant, and no requirement for ohmic leads. Theory of operation of the detector, including design factors and a summary of progress to date are given. A development program is also suggested. (Author)

AD-610 153 Div. 30, 31
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
RESONANCE TESTING IN THE DETERMINATION OF FIXED BASE NATURAL FREQUENCIES OF SHIPBOARD EQUIPMENT.
Interim rept.,
by Lawrence P. Petak and Ronald E. Kaplan. 15 Dec 64, 21p NRL-6176
Projs. SF013 10 01 1790; RR009 03 45 5757
Unclassified report

Descriptors: (*Test methods, Vibration), (*Vibration, Naval equipment), (*Naval equipment, Shipborne), Frequency, Resonance, Equation of motion, Test equipment, Shock (Mechanics), Statistical tests.

Examination shows that the results of past shake tests to determine the fixed base natural frequencies of in-place shipboard equipment-foundation systems are not correct. A review of the equations of motion for a five-degree-of-freedom system revealed that choosing the driving point on the equipment could not give the desired frequencies. The review showed that the fixed base frequencies could be obtained if the driving point were on or below the base of the equipment-foundation system. Prominent valleys occur in the response of the base at the fixed base frequencies of the system above the base and of the supporting structure below the driving point. Comparison of these valleys with prominent peaks in a plot of the ratio of equipment response to base response will eliminate the extraneous frequencies of the structure below the driving point. Although this method functioned well when applied to systems simulated with an analog computer, it will be difficult in the field to place a shaker having sufficient force below the equipment. A situation involving rotation as well as translation magnifies the difficulties, since additional shakers are necessary which are capable of phase control and a range of force ratios at each frequency. (Author)

AD-610 175 Div. 30, 9
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE PERFORMANCE OF A SHOCK TUBE MODIFIED FOR USE IN RAMJET INLET INVESTIGATIONS.
Master's thesis,
by Terence Joseph O'Rourke. Aug 64, 68p
GA/ME/64-4
Unclassified report

Descriptors: (*Shock tubes, Ramjet inlets), (*Ramjet inlets, Tests), (*Convergent-divergent nozzles, Shock tubes), Feasibility, Models (Simulations), Distortion, Fluid flow, Boundary layer, Schlieren photography, Supersonic flow, Performance (Engineering).

A reduced-width test section containing Mach 4, convergent-divergent nozzle blocks was attached to a shock tube. Mach number and flow steadiness measurements were made in the test section. A ramjet inlet model was installed in the test section. Flow field Schlieren pictures were recorded using still and high-speed motion picture photography. This study demonstrated the feasibility of using the shock tube for ramjet inlet studies. Comparison of theoretical flow patterns with the flow patterns over the inlet model showed close agreement except for distortion due to the boundary layer on the walls of the tube. The boundary layer, more than 1/8 inch thick, made the test section unsuitable for quantitative measurements of the flow patterns. The reduced width of the test section improved the quality of the Schlieren pictures and the test flow times obtained in previous studies (AD-292 180 and AD-419 597). Steady flows of average Mach number 3.05 were obtained for 20 milliseconds. Test flow time was a function of shock strength, while the test section Mach number and flow steadiness appeared to be independent of shock strength. (Author)

AD-610 177 Div. 30, 9
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DEVELOPMENT OF A DIRECT READING FLOW METER.
Master's thesis,
by David John South. Aug 64, 68p GA/ME/64-6
Unclassified report

Descriptors: (*Flowmeters, Gas flow), (*Gas flow, Flowmeters), Pressure gages, Transducers, Voltage, Power supplies, Diodes, Circuits, Compressed air, Fluid mechanics.

An electronic device which can be used with a sharp-edged orifice to directly measure the mass flow rate of gaseous fluids was developed. The device uses potentiometer-type pressure transducers to measure the pressure upstream and across the orifice and operates on these measurements to produce an indication of mass flow rate. The flow meter is a small self-contained unit; the electrical inputs from the transducers enter the device through connectors on the chassis. D-C voltages are used throughout the flow meter. Differential amplifiers, cathode followers, and a regulated power supply are used to reduce drift. A zener diode network is used to establish a circuit whose output voltage is proportional to the reciprocal of its input voltage. Experiments using the flow meter indicate that measurement errors are on the order of ten per cent or less over a flow range of twenty to one if two orifices are used. Only compressed air was used during the tests. (Author)

AD-610 188 Div. 30, 2, 24
OTS Prices: HC $3.00/MF $0.50

Autometric Facility, Raytheon C., Alexandria, Va.
A COMPREHENSIVE ZENITH CAMERA DATA REDUCTION PROGRAM FOR THE CDC 1604 B COMPUTER IN FORTRAN LANGUAGE.
Final rept., vol. 1, Apr-Jun 64,
by Howard Garcia and Herbert Chapple. Dec 64, 52p
Contract AF30 602 3338, Proj. 040A
RADC TDR64 391 V1

Unclassified report

Descriptors: (*Astronomical data, Data processing systems), (*Astronomical cameras, Astronomical data), (*Data processing systems, Digital computers), Programming languages, Matrix algebra, Euler's angles, Stars, Atmospheric refraction, Distortion, Errors, Astronomical geodesics, Geodesics.

A data reduction program for the zenith camera designed by Autometric Operation Division of Raytheon is presented. The reduction program is written in FORTRAN language compatible to the CDC 1604B computer. The reduction includes the solution for the mean and apparent places of updated stars, the tangential solution, and the error analysis. The tangential solution eliminates the effects of radial lens distortion and atmospheric refraction. Flow diagrams, FORTRAN source program, data formats, and the load sequence are presented. An example of the data formats for a sample computation is included in the report. (Author)

AD-610 197 Div. 30, 15
OTS Prices: HC $4.00/MF $1.00

Rias, Inc., Baltimore, Md.
NONLINEAR SYSTEM ANALYSIS AND SYNTHESIS. PART II. STUDY OF THE LUR'E PROBLEM AND OF STOCHASTIC OPTIMAL CONTROL,
by R. E. Kalman. Dec 64, 142p
Contract AF33 657 8559, Proj. 8225, Task 822501
FDL TDR64 58, p2

Unclassified report

See also 608 927.

Descriptors: (*Optimization, Control systems), (*Control systems, Mathematical analysis), (*Functions, Control systems), Synthesis, Nonlinear systems, Stochastic processes, Stability, Difference equations, Perturbation theory, Differential equations, Numerical analysis, Dynamics, Matrix algebra, Programming (Computers).

Research was mainly concerned with: (a) The construction of Lyapunov functions by machine methods, especially as regards the so-called problem of Lur'e. (b) The formulation of stochastic optimization problems. Research topics presented in this report are: General Discussion; On the absolute stability of sampled-data control systems; On the absolute stability of a system of finite difference equations; On the absolute stability of a nonlinear sampled-data system; Irreducible realizations and the degree of a matrix of rational functions; Resolution of the Problem of Lur'e; General Discussion; Near Optimal control in the presence of small stochastic perturbations; On the differential equations satisfied by conditional probability densities of Markov processes, with applications; On the stochastic maximum principle; fixed-time of control; A 'time-domain' successive approximation method for some linear optimal stochastic systems. (Author)

AD-610 198 Div. 30, 15
OTS Prices: HC $2.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
TOWARD A HOMOLOGICAL ALGEBRA OF AUTOMATA III: 3. COMPOSITION SERIES OF AUTOMATA. 4. EXTENSIONS OF Q-AUTOMATA.
Technical rept.,
by Yehoshafat Give'on. Dec 64, 40p ORA-06689, ORA-03105-31-T
Contract Nonr122421; Grant DA ARO D31 124G588,
Projs. 4049M, NR049 114

Unclassified report

Descriptors: (*Algebra, Automata), (*Mathematical logic, Automata), Monoids, Mapping (Transformations), Projective geometry, Set theory, Groups (Mathematics), Series, Computers.

AD-610 200 Div. 30, 15
OTS Prices: HC $1.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
TOWARD A HOMOLOGICAL ALGEBRA OF AUTOMATA I: 1. THE REPRESENTATION AND COMPLETENESS THEOREM FOR CATEGORIES OF ABSTRACT AUTOMATA.
Technical rept.,
by Yehoshafat Give'on. Dec 64, 28p
ORA-06689, ORA-03105-32-T
Contract Nonr122421, Grant DA ARO D31 124G588,
Projs. 4049M, 03105

Unclassified report

Descriptors: (*Algebra, Automata), (*Mathematical logic, Automata), Monoids, Mapping (Transformations), Set theory, Groups (Mathematics), Theorems, Computers.

In this paper the author formulates the categorical theory of abstract automata. Two immediate basic problems are posed. First, one wonders how restricted the study of abstract automata is when one confines himself to those properties which are formulated by means of the notions of category theory only. This is a mathematical question whose answer should be proved. The author proves the completeness of the categorical study of abstract automata for a wide class of input monoids, a class which includes all types of monoids employed in the theory of finite automata. In order to get this result, a general representation theorem for abstract automata is derived. The second question is psychological. How well does the categorical study of automata suit our intuitions and our problems. The answers to such a problem is not a matter of proof. The development presented in this paper has convinced the author of the potentiality of this new approach toward

automata. Thus, this paper serves as a prelude to a series of papers which will exploit homological and categorical algebra methods for the sake of a mathematical theory of automata. (Author)

AD-610 211 Div. 30, 5
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
A TECHNIQUE FOR UTILIZING THE IBM OR THE RCA RANDOM-ACCESS MASS-MEMORY DEVICES TO STORE THE DATA BASE OF A COMMAND AND CONTROL INFORMATION PROCESSING SYSTEM,
by Paul E. Friedenberg and Thomas S. Walton.
Nov 64, 13p DTMB-1917
Proj. SS192 001, Task 7160

Unclassified report

Descriptors: (*Command and control systems, Computer storage devices), (*Data processing systems, Computer storage devices), Digital computers, Magnetic core storage, Data storage systems.

Two different mass memories are studied for their suitability to store the data base in a command and control information-processing system. The IBM unit employs metal disk packs whereas the RCA unit uses magazines of plastic cards for the recording medium. However, analogies in their logical capabilities make it possible to use identical methods of file organization. It is shown that the equipment can be effectively utilized to process formated files on a random-access basis. Compact indexes are generated so that items can be quickly located either by name or by content. The times required for updating and searching such files are analyzed, and the advantages to be gained over conventional techniques are indicated. (Author)

AD-610 249 Div. 30, 1
OTS Prices: HC $3.00/MF $0.75

Douglas Aircraft Co., Inc., Long Beach, Calif.
ARMY-NAVY INSTRUMENTATION PROGRAM HISTORICAL REPORT.
Jun 62, 80p LB-40641

Unclassified report

Descriptors: (*Instrumentation, System engineering), (*Systems engineering, Armed forces research), Display systems, Research program administration, Feasibility studies, Computers, Human engineering, Materials, Circuits, Simulation, Flight instruments, Data, Miniature electronic equipment, Instrument panels.

Lack of ability to implement instrumentation and display systems which would better fit man's requirements caused ANIP to conduct research in many areas for basic information and for application of information already at hand. These areas included computer theory and implementation, materials, display devices, sensors, feasibility, human factors and systems analysis. Feasibility studies included one fixed-wind flyable system and two rotary-wing systems. Laboratory facilities are used for human factors and system research, evaluation and demonstration. Results of the program are breakthroughs in human factors requirements for display content, display design and implementation, materials and their relation to electromagnetic phenomena, display devices, computer theory and construction advances, and inertial sensor conceptual evaluation which has produced a new concept having unusually high practical application potential. All other results are overshadowed by proof that the man-machine system and requirements approach coupled with research allocated to problem areas on a priority basis can yield systems of superior performance in minimum cost and time.

AD-610 255 Div. 30, 8, 16
OTS Prices: HC $3.00/MF $0.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
ADVANCED SELECTIVE MONITORING SYSTEMS.
Final rept. for Jan 63-Jun 64,
by A. Babich and G. Morton. Nov 64, 52p
Contract AF33 657 10462, Proj. 7222, Task 722203
AMRL TR64 97

Unclassified report

Continuation of Contract AF33 616 8370.
See also AD-295 589.

Descriptors: (*Discriminators, Data processing systems), (*Data processing systems, Discriminators), (*Monitors, Discriminators), Electronic recording systems, Communication theory, Data transmission systems, Telemeter systems, Signals, Redundant components, Selection, Microminiaturization (Electronics), Analog systems, Multiplex, Channel selectors, Cardiography, Information retrieval, Biophysics.

In order to reduce the amount of data obtained in multiple-input data acquisition systems--subsequently reducing power and size requirements in space vehicles, or reducing processing time in a computer analysis--a Selective Monitoring System was built and tested. The present system is an extension of a laboratory model which was used as criteria for signal selection signal changes from a steady state and signal excursions beyond predetermined limits. That system (laboratory model) was expanded to include originating (encoding) and terminal (decoding) equipment for a PCM data-transmission channel. The encoding and decoding equipment used the selective-monitoring characteristics of the laboratory model to obtain a data transmission rate lower than that required in an ordinary multiple input data acquisition system. Signals selected by the encoder unit were reconstructed in the decoder unit. A rate analog processor, compatible with the Selective Monitoring System, and suitable for use as a cardiotachometer, was built and tested. Performance requirements in an operational system are described. The reduction in size and power consumption obtainable with microminiaturization is analyzed. (Author)

AD-610 257 Div. 30, 12, 25
OTS Prices: HC $3.00/MF $0.75

American Science and Engineering, Inc., Cambridge, Mass.
PERFORMANCE OF LANGMUIR PROBES IN MEASUREMENTS ABOARD A REENTRY VEHICLE.
Final rept.,
by Shimshon Frankenthal. 31 Jan 64, 54p ASE-510
Contract AF19 628 2367, Projs. 8662, ARPA Order 363 62
AFCRL 64 975

Unclassified report

Descriptors: (*Probes (Electromagnetic), Plasma medium), (*Reentry vehicles, Probes (Electromagnetic)), Space environmental conditions, Telemeter systems, Telemetering data, Plasma sheath, Ions, Electrons, Space charges, Electrical properties, Performance (Engineering).

The theory of Langmuir probes is reviewed. Particular attention is accorded to the interpretation of data obtained when the probe is in saturation, and to plasmas in which the characteristic ion and electron energies are comparable. Various methods for interpreting the probe measurements are enumerated. This information is employed in the subsequent discussion, which concerns the performance of Langmuir probes flown aboard a reentry vehicle, and the interpretation of data telemetered from these probes. (Author)

AD-610 268 Div. 30, 16
OTS Prices: HC $3.00/MF $0.75

AiResearch Mfg. Co., Los Angeles, Calif.
LIQUID CENTRIFUGE FEASIBILITY STUDY.
Technical rept.,
by G. T. Greene. Nov 64, 73p CP-303
Contract DA18 064AMC242A Unclassified report

Descriptors: (*Centrifuges, Feasibility studies), Particles, Yeasts, Separation, Fluid flow, Flow visualization, Flotation, Particle size, Stresses.

A study is described in which the feasibility of separating and discharging from a liquid centrifuge 40- to 60-millimicron particles when introduced in a feed slurry of 5 to 8 gal per hr was determined. Continuous discharge of solids was demonstrated using a 4000-rpm, 1000-g flow visualization rig which consisted of a flat transparent rotor in which the flow patterns were observed with a stroboscopic light. Separation of yeast and various plastic particles in water suspensions were observed and discharge was achieved in three ways: (1) a continuous flowing carrier fluid having a density equal to that of the particles, (2) continuous flotation of the particles on top of an inert high-density fluid, and (3) semicontinuous by periodically filling the rotor with an inert high-density fluid which displaces and moves the particles to the center of the rotor. A preliminary analysis was made of the 5- and 8-gal-per-hr centrifuge system. To demonstrate the mechanical integrity of the prototype suspension system, a 4.38-in. diameter by 15-in. long fiberglass rotor having a theoretical flow rate of 1.3 gal per hr was designed, fabricated, and tested to 51,000 rpm (165,000 g) with water flowing through the machine and tested to 54,500 rpm without liquid. (Author)

AD-610 282 Div. 30, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
MATHEMATICAL DOWSERS AND DIGITAL DIVINERS,
by Richard Bellman. Jan 65, 7p P-3049
Unclassified report

Descriptors: (*Digital computers, Mathematical prediction), (*Mathematical prediction, Digital computers), Mathematics, Physics, Medical research, Economics, Computers.

The role of the digital computer in scientific research is studied. Stressed are problems of predition and of system identification.

AD-610 288 Div. 30
OTS Prices: HC $4.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANALYSIS AND SYNTHESIS OF AUTOMATIC CONTROL SYSTEMS,
by Chih-yieh Shu. 8 Jan 65, 117p FTD-TT-64-24
TT 65 61000
Unclassified report

Edited trans. of Shang Hai Shih K'o Hsueh Chi Shu Lun Wen Hsuan Chi, Kung Ch'eng Chi Shu sic 1962, v. 1, p. 283-359.

Descriptors: (*Control systems, Automatic), (*Adaptive control systems, Theory), Linear systems, Servomechanisms, Feedback, Synthesis, Mathematical analysis, China, Reviews.

The present paper reviews the results of many previous investigations and develops a new theory and methodology for the analysis and synthesis of linear continuous control systems. The principles and methods proposed in this paper are not only applicable to the single-variable systems of feedback control and regulation, but also valid for the multivariable control systems of higher complexity. Matrices, the most appropriate mathematical tool for description of multivariable control process is used to discuss the problem of synthesis in control systems having several external disturbances (loads). The concept of the transfer sequence of a variable, derived from the transfer function of the variable by means of series is developed. A detailed discussion on the calculation and assessment of the quality criteria for the responses of individual controlled variables is given. Finally, I. L. Chebyshev's concept of the best uniform approximation is used to devise an extremely simple and effective method of synthesizing optimum transfer functions for a number of variables.

AD-610 309 Div. 30
OTS Prices: HC $1.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
RELATION BETWEEN LIFETIME DISTRIBUTION AND THE STRESS LEVEL CAUSING THE FAILURES,
by Erich Pieruschka. 3 Feb 61, 22p LMSC-800440
Contract NOrd17017
Unclassified report

Descriptors: (*Failure (Mechanics), Statistical functions), Life expectancy, Stresses, Reliability, Analysis of variance.

This report is a continuation of the study in which the different sources for the occurrence of device failures were discussed. A method was developed for computing the mortality of environmental failures from the stress-strength distribution of a part of a device. Two models for computation of wear-out mortality are assumed, one considering sensitive devices, the other considering insensitive devices. Combinations of the mortality functions were discussed and applied to the study of actual device mortality functions. This present study is extended to cover the change in the lifetime distribution when the stresses which are significant for the occurrence of failures are increased or decreased.

AD-610 318 Div. 30, 18
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
PROGRAM STRUCTURE FOR MILITARY REAL-TIME SYSTEMS,
by J. H. Burrows. Jan 65, 29p SR-122
Contract AF19 628 2390, Projs. 416, 502
ESD TDR64 161
Unclassified report

Descriptors: (*Programming (Computers), Military requirements), (*Data processing systems, Programming (Computers), Real time, Computers, Programming languages, Systems engineering, Operations research.

This report describes the program design and accompanying tools required to fabricate an initial operational program which is subject to change through use and as a result of changes in the environment of the system. Major design decisions are shown to have little relation to the programming language that is chosen for the statement of the logical data transformations to be implemented by the final program. The actual coding required for performing the logical transformations turns out to be a relatively small part of the overall design job. The choice of the programming language to be used is just an initial decision in the process of selecting adequate tools for assisting the production and modification of real-time programs. (Author)

AD-610 320 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
METHODS OF CONSTRUCTING PNEUMATIC COMPUTERS OF CONTINUOUS ACTION AND WAYS OF UTILIZING THEM,
by N. D. Lanin and V. I. Pashintseva. 9 Jan 65, 17p
FTD-TT-64-498
TT 65 61037

Unclassified report

Unedited rough draft trans. of mono. Primenenie Vychislitel'noi Tekhniki dlya Avtomatizatsii Proizvodstva: Trudy Soveshchaniya, Oct 59, Moscow, 1961, p. 445-457.

Descriptors: (*Computers, Pneumatic systems), (*Pneumatic systems, Computers), Fluid flow, Nonlinear systems, USSR.

Consideration is given to the problems of the construction of pneumatic computing devices of continuous action, and a computing machine of continuous action which was created on the basis of these elements is described.

AD-610 334 Div. 30, 23
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
DIGITAL COMPUTING IN THE MATHEMATICS DEPARTMENT DURING FISCAL YEAR 1964,
Technical rept.,
by Richard C. Roberts. 3 Nov 64, 27p
NOLTR 64-196, M-56
Proj. 651 0100

Unclassified report

Descriptors: (*Digital computers, Naval research laboratories), (*Naval research laboratories, Digital computers), (*Mathematics laboratories, Digital computers), Ordnance laboratories, Computers, Costs, Reliability, Programmers, Computer personnel, Computer operators, Research program administration, Navy.

This report contains highlights of the digital computing activities of the Mathematics Department of NOL for fiscal year 1964. These highlights include the purchase of a large part of the 7090 and 1401 computer systems. The upward trend in computer utilization shown in the previous fiscal year has continued during fiscal year 1964. Some additional background information is given to round out the picture of the activities concerned with digital computing in the Mathematics Department. (Author)

AD-610 336 Div. 30, 8, 25
OTS Prices: HC $1.00/MF $0.50

Milan Univ. (Italy).
SOME APPLICATIONS OF PLANAR PN JUNCTION AS LIGHT EMITTERS IN SPACE RESEARCH.
Technical rept.,
by G. Boella, G. Degli Antoni, and P. Podini. 10 Sep 64, 14p
Grant AF EOAR63 86
AFCRL 64 877

Unclassified report

Descriptors: (*Light transmission, Transistors), (*Transistors, Light transmission), Silicon, Semiconductor devices, Optics, Photomultipliers, Calibration, Space probes, Instrumentation.

Apart from conventional applications, silicon PN junctions are used in Nuclear and Cosmic Ray Physics as particle and photon detectors. These latter applications are valuable for space research where PN junctions may be conveniently used because of their low power consumption, low weight and ruggedness. Nevertheless in cosmic-ray satellite experiments, photomultipliers are frequently to be preferred to solid state detectors since their gain is intrinsically noiseless. Owing to the duration of these experiments, photomultipliers require calibration to compensate for gain variations due to aging effects as well as to the severe environmental conditions influencing the photomultiplier and its associated electronic circuitry. In view of this, research is carried out to establish the possibility of using planar PN junctions as standard light generators when sufficient inverse voltage is applied to produce breakdown. In this report preliminary results on the characteristics of light emission and a few possible applications in space research are described.

AD-610 345 Div. 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ON THE CONSTRUCTION OF HIGH SPEED CONTROL COMPUTERS,
by I. N. Bukreev. 22 Dec 64, 12p FTD-TT-64-755
TT 65 61018

Unclassified report

Unedited rough draft trans. of mono. Primenenie Vychislitel'noi Tekhniki dlya Avtomatizatsii Proizvodstva: Trudy Soveshchaniya, Oct 59, Moscow 1961, p. 419-426.

Descriptors: (*Digital computers, Control systems), Computers, Computer storage devices, Velocity, Signals, Mathematics, Automatic, Circuits, USSR.

Various aspects of using TsVM digital computers in automatic control systems are discussed.

AD-610 359 Div. 30, 26
OTS Prices: HC $2.00/MF $0.50

Ampex Corp., Redwood City, Calif.
THE THEORY OF THE INFINITELY WIDE, PERFECTLY FLEXIBLE SELF-ACTING FOIL BEARING,
by A. Eshel and H. G. Elrod, Jr. Dec 64, 29p
AMPEX RR-64-14

Unclassified report

Prepared in cooperation with Columbia Univ., New York.

Descriptors: (*Magnetic tape, Bearings), (*Gas bearings, Thickness), Foils, Films, Computers, Boundary layer, Lubrication, Mathematical analysis, Mechanical properties, Air, Differential equations, Velocity, Geometric forms, Theory.

The differential equations applicable to the film thickness beneath an infinitely wide, perfectly flexible self-acting tape are derived in the paper. Accurate numerical solutions are obtained for the film thickness in both the entrance and exit regions. These solutions have general applicability to situations where the entrance and exit regions are separated by a third region of uniform thickness. (Author)

31. Ships and Marine Equipment

AD-610 059 Div. 31
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
DAMPING CHARACTERISTICS OF SHIPS IN VERTICAL FLEXURE AND CONSIDERATIONS IN HULL DAMPING INVESTIGATIONS.
Research and development rept.,
by Donald C. Robinson. Dec 64, 29p DTMB 1876
Unclassified report

Descriptors: (*Ship hulls, Vibration), (*Vibration, Damping), Mathematical analysis, Model basins.

A study was made of technical considerations in past and current Model Basin methods of conducting damping investigations of ship hulls. The report includes a summary of damping values of ships in vertical vibration and a review of factors affecting damping, methods of exciting hull vibrations, methods of determining damping from experimental data, and methods of applying damping in computation. (Author)

AD-610 073 Div. 31
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THE DTMB MARK I KNOTMETER.
Research and development rept.,
by George B. Springston, Jr. Dec 64, 31p
DTMB-1944
Unclassified report

Descriptors: (*Meters, Velocity), (*Ships, Velocity), Towing cables, Towed bodies, Handling, Instrumentation, Tachometers, Hydrodynamics, Transducers, Impellers, Calibration, Theory, Operation, Design, Display systems, Digital systems.

A system to measure the speed of a ship through the water has been developed. The system consists of a cable-towed body, associated instrumentation, and handling equipment. A transducer in the towed body senses the rotation of an impeller on the body and sends a signal up the towcable for display on a digital indicator to provide a measure of the ship speed in the range from 3 to 30 knots. Under steady towing conditions, the speed can be determined to an accuracy of about one percent. In contrast to many speed measuring systems, the DTMB Mark I Knotmeter is not influenced by the characteristics of the ship since the transducer can be located outside the significant pressure field of the ship. (Author)

AD-610 137 Div. 31
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
MODEL TEST RESULTS AND PREDICTED EHP FOR AN 86-FOOT PERSONNEL BOAT, FROM TESTS OF MODEL 4675.
Research and development rept.,
by Eugene P. Clement and Charles W. Tate, Sr.
Dec 58, 9p DTMB-1288
Proj. NS715 086
Unclassified report

Descriptors: (*Boats, Model tests), Ship models, Hulls (Marine), Experimental data, Design, Fluid dynamic properties, Fluid flow, Buoyancy, Velocity, Center of gravity, Marine surface propulsion.

Smooth-water model tests were made of an 86-ft personnel boat designed for all-weather operation. The model was tested for ehp at full-scale displacements of 130,000 lb, 140,000 lb, and 150,000 lb. In addition, at one speed and displacement, the lines of flow were determined by the acid-trace method, in order to find the appropriate location for the bilge keels. (Author)

AD-610 138 Div. 31
OTS Prices: HC $3.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
RECENT DEVELOPMENTS IN THE THEORY OF SHIP VIBRATION,
Revised ed.,
by R. T. McGoldrick, A. N. Gleyzal, R. L. Hess, and G. K. Hess, Jr. Oct 53, 55p DTMB-739, rev.
Proj. NS712 064
PB 165 103
Unclassified report

Revision of rept. dtd. Feb 51.

Descriptors: (*Ship hulls, Vibration), (*Vibration, Ship hulls), Theory, Equations of motion, Difference equations, Deformation, Torque, Merchant vessels.

It is shown in this report that by considering the ship hull as a floating beam having shearing and bending flexibility with a distributed viscous damping proportional to mass it is possible to derive equations of motion under external forces by the general Rayleigh method which yields a solution in terms of normal modes of motion. Practical methods of determining natural frequencies and normal modes are discussed, and it is shown that solutions based on finite-difference equations can be obtained with the use either of a digital sequence calculator or an electrical analog. A discussion is given of coupled horizontal bending and torsional modes as well as vertical modes of vibration. It is pointed out that the finite-difference-equation method applied to vertical vibration of a vessel of merchant type has given results in good agreement with experimental values up to the sixth vertical mode. (Author)

AD-610 164 Div. 31
OTS Prices: HC $2.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC TESTS TO DETERMINE STABILITY AND STRESS CHARACTERISTICS OF STIFFENED CYLINDERS WITH QUASI-TUBE INSERTS,
by James A. Nott. Nov 64, 37p DTMB-1874
Proj. S R011 01 01
Unclassified report

Descriptors: (*Stiffened cylinders, Model tests), (*Submarine hulls, Models (Simulations)), Hydrostatic pressure, Stresses, Stability, Submarines, Guided missile launchers, Guided missiles (Underwater-to-surface), Mathematical analysis, Mechanical properties, Rings, Distribution, Aluminum, Deformation.

Four aluminum models were tested under external hydrostatic pressure to study the structural stability and stress distributions in ring-stiffened cylinders supported with quasi-tube inserts. Test results for the geometries studied showed that the quasi tubes decreased the collapse pressures of the cylinders only 6 percent. Stresses in the cylinders were increased up to 63 percent.

Comparisons between existing theoretical formulas for collapse pressures and experimental values for models with and without quasi tubes indicate agreement within approximately 7 percent. (Author)

AD-610 171 Div. 31, 9
OTS Prices: HC $3.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
TABLES OF THE GOLDSTEIN FACTOR,
Research and development rept.,
by C. L. Tibery and J. W. Wrench, Jr. Dec 64,
71p DTMB-1534
Proj. S R003 03 01 Unclassified report

Descriptors: (*Propellers (Marine), Hydrodynamics), (*Fluid flow, Mathematical analysis), Tables, Loading (Mechanics), Cavitation, Iterative methods, Computers, Functions, Series, Computers, Ships.

The tables of the Goldstein factor were computed on an IBM 7090 system. They were computed for the purpose of supplying more extensive and reliable information than that available in similar tables of Goldstein, Lock and Yeatman, Kramer, Tachmindji and Milam, and the second of the present authors. These tables are applicable to the calculation of the distribution of the circulation along lightly loaded, optimum propellers for which the number of blades ranges from two to ten, inclusive. The Goldstein factor determines the effect of a finite number of propeller blades on the circulation, and simultaneously relates the maximum value of the tangential velocity component induced at a lifting line with its circumferential average. The emphasis on an increased number of blades, as reflected in these more extensive tables, arises from the need to alleviate the loading or cavitation problems associated with the increased power of modern ships. (Author)

32. Miscellaneous Arts and Sciences

AD-609 970 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Lab., White Oak, Md.
NOL RETRIEVAL SYSTEM FOR THE 7090.
Technical rept.,
by James J. Crockett. 1 Oct 64,
Proj. 675 0502
NOL TR64 125, NOL MDM54

Unclassified report

Descriptors: (*Information retrieval, Programming (Computers)), (*Programming (Computers), Information retrieval), (*Digital computers, Information retrieval), (*Search theory, Information retrieval), Naval research laboratories, Data processing systems, Documentation, Computers, Control sequences, Programming languages, Ordnance.

The NOL Information Retrieval System is a set of programs written in FAP for the 7090. The NOL technical library staff uses this system for document file establishment, maintenance, and searching. A detailed description is given of the methods used to accomplish the above mentioned tasks. (Author)

AD-609 993 Div. 32, 15
OTS Prices: HC $3.00/MF $0.75

Copenhagen Univ. (Denmark).
SINGLE SAMPLING INSPECTION PLANS WITH SPECIFIED ACCEPTANCE PROBABILITY AND MINIMUM AVERAGE COSTS.
Technical rept. no. 6,
by A. Hald. Dec 64, 81p
Contract N62558 3073, Proj. NR042 225

Unclassified report

See also AD-602 396.

Descriptors: (*Sampling, Economics), (*Economics, Sampling), Probability, Costs, Binomials, Statistical distributions, Statistical analysis, Operations research.

The purpose of the paper is to give a tabulation and discussion of properties of a system of single sampling attribute plans obtained by minimizing average costs under the restriction that a point on the OC-curve has been fixed. Three systems are studied corresponding to different restrictions: (a) The LTPD system with a fixed consumer's risk, P(P sub 2) =0.10, (b) The AQL system with a fixed producer's risk, Q(P sub 1)=0.05. (c) The IQL system with P(P sub 0)=1/2 for P sub 1< P sub 0< P sub 2. LTPD and AQL plans for a double binomial prior distribution may be found from the corresponding plans for a single binomial prior distribution by a suitable change of cost parameter. The solution of the minimization problem and corresponding tables are given for the three systems. The asymptotic properties of the solution are also studied.

AD-610 083 Div. 32
OTS Prices: HC $6.00/MF $1.50

Wayne State Univ., Detroit, Mich.
RESEARCH IN MACHINE TRANSLATION. RUSSIAN TO ENGLISH.
Annual rept. no. 6, 1 Sep 63-31 Aug 64,
by H. H. Josselson. 31 Aug 64, 249p
Contract Nonr256200

Unclassified report

See also AD-421 932.

Descriptors: (*Machine translation, Analysis), (*Programming (Computers), Machine translation), Language, Coding, Dictionaries.

Research has been continued on the aspects of mechanical translation which contribute towards the creation of a meaningful finished product. The Russian-English mathematical glossary and text tapes have been corrected and updated. The grammar coding has also been modified somewhat in order to make it suit better the needs of further syntactic processing. New programs to facilitate dictionary and text tape updating have also been written, as well as programs which complete the automation of the processing of raw text through syntactic analysis. A start has also been made in investigating the problems of syntactic semantics in general, and the problem of verbal government in particular, by appropriately coding all verbs found in the mathematical corpus.

AD-610 085 Div. 32, 15
OTS Prices: HC $7.20/MF $2.00

Princeton Univ., N. J.
SMALL-SAMPLE PROPERTIES OF VARIOUS SIMULTANEOUS-EQUATION ESTIMATORS: THE RESULTS OF SOME MONTE-CARLO EXPERIMENTS,
by J. G. Cragg. Oct 64, 419p ERP-RM-68
Contract Nonr185816

Unclassified report

Descriptors: (*Economics, Mathematical models), (*Simultaneous equations, Monte Carlo method), (*Statistical analysis, Simultaneous equations), (*Monte Carlo method, Mathematical models), Numerical methods and procedures, Stochastic processes, Analysis of variance, Least squares method, Errors, Optimization, Matrix algebra, Sampling, Equations, Digital computers, Experimental data, Pseudo-random systems.

This study reports the results of 172 Monte Carlo experiments on the small-sample properties of some simultaneous equation estimators. The estimators studied were Direct Least-Squares, Two-Stage Least-Squares, Nagar's Unbiased k-Class Estimator, Limited-Information Maximum-Likelihood, Three-Stage Least-Squares, Full-Information Maximum-Likelihood and Least-Squares used to estimate the reduced form. The estimates of the structural equations, their standard errors, the estimates of the variance-covariance matrix of disturbances, the estimates of the reduced-form coefficients and the predictive ability of the methods were examined. (Author)

AD-610 131 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
AN ANALYSIS OF THE MULTIPLE INSTANTANEOUS RESPONSE FILE,
by Ronald J. Ferris. Dec 64, 27p RADC-TDR64 457
Proj. 4594

Unclassified report

Descriptors: (*Information retrieval, Special purpose computers), (*Documentation, Data processing systems), Data storage systems, Indexes, Storage, Automatic, Computers.

The functional capability of a device called the Multiple

Instantaneous Response File (MIRF) is clarified. The MIRF is a document surrogate storage and retrieval device which employs a mechanically alterable, read only content addressable, parallel search memory. Organization of the memory permits the user of the file to be on-line in addition to providing automatic search refinement functions. Some attention is given to the evaluation of MIRF, but this involves essentially a review of the evaluation problem. This report does not discuss the hardware aspects of the MIRF but it does briefly mention the applicability of memories having the same basic features. (Author)

AD-610 184 Div. 32, 18
OTS Prices: HC $4.00/MF $0.75

Center for International Studies, Mass. Inst. of Tech., Cambridge.
THE ROLE OF MILITARY ASSISTANCE IN THE PROBLEM OF ARMS CONTROL: THE MIDDLE EAST, LATIN AMERICA, AND AFRICA,
by Catherine McArdle. 10 Aug 64, 102p C/64-24
Contract ACDA IR24

Unclassified report

Descriptors: (*Middle East, Arms control), (*Africa, Arms control), (*South America, Arms control), (*National defense, United States Government), USSR, Great Britain, China, France, West Germany.

Any examination of arms control proposals with respect to the developing areas must take into full consideration the role of military assistance with respect not only to the absolute level of regional armament but also to the interests and commitments of both the aided nations and the major powers. The attempt is made to sketch out a basis for such consideration, to describe the nature and scope of military assistance programs in the Middle East, Latin America, and Africa, and to suggest the significant problems these programs pose for any future regional arms control arrangements.

AD-610 185 Div. 32, 18
OTS Prices: HC $6.00/MF $1.50

Center for International Studies, Mass. Inst of Tech., Cambridge.
MILITARY TECHNOLOGY IN DEVELOPING COUNTRIES,
by H. Roberts Coward. 15 Apr 64, 288p C/64-5
Contract ACDA IR24

Unclassified report

Descriptors: (*National defense, Government (Foreign)), (*Government (Foreign), National defense), (*Armed forces (Foreign), National defense), Armed forces budgets, Africa, Middle East, Asia, South America, Weapons, Nuclear weapons, Military personnel.

Contents: Approaching the problem - the military in developing countries; The setting - security problems in developing countries; The problem of reliable information; Military forces (Bases for comparison, Security and mobilized manpower, Stability of defense efforts, Force requirements, Other considerations); Resources for military efforts (Economics and defense, Level of defense expenditure, Defense expenditure per capita, Defense expenditure and the armed forces); The diffusion of military technology (Local capabilities, Client states and the obsolescence of great power equipment, The arms traffic, Nuclear technology); Summary of current military capabilities in developing countries; Defense statistics on developing countries - 1955-1965; Projections of armed forces and defense budgets in developing countries - 1961-1975.

AD-610 186 Div. 32, 18
OTS Prices: HC $7.20/MF $2.00

Center for International Studies, Mass. Inst. of Tech., Cambridge.
REGIONAL ARMS CONTROL ARRANGEMENTS FOR DEVELOPING AREAS. ARMS AND ARMS CONTROL IN LATIN AMERICA, THE MIDDLE EAST, AND AFRICA.
21 Sep 64, 418p C/64-24
Contract ACDA IR24

Unclassified report

Descriptors: (*Middle East, Arms control), (*Africa, Arms control), (*South America, Arms control), Armament, Disarmament, Algeria, Tunisia, Morocco, Libya, North Africa, Armed Forces (Foreign), Arabia, Israel.

Contents: Arms control in Latin America; Arms control in the Middle East; Arms control in North Africa; Arms control in sub-Saharan Africa; International regional organizations and regional arms control relationships between regional arms control agreements and great power disarmament negotiations; Regional impact of great power disarmament and arms control.

AD-610 187 Div. 32, 18
OTS Prices: HC $2.00/MF $0.50

Center for International Studies, Mass. Inst. of Tech., Cambridge.
REGIONAL ARMS CONTROL ARRANGEMENTS FOR DEVELOPING AREAS. ARMS AND ARMS CONTROL IN LATIN AMERICA, THE MIDDLE EAST, AND AFRICA.
Summary rept.
21 Sep 64, 28p C/64-25A
Contract ACDA IR24

Unclassified report

Descriptors: (*Middle east, Arms control), (*Africa, Arms control), (*South America, Arms control), (*National defense, United States Government), Armament, Disarmament, Arabia, Israel, North Africa, Nuclear weapons, Central America, United Nations.

This study is concerned with the possibilities, limitations, and prospects of arms control and disarmament for three major underdeveloped areas of the world-Latin America, the Middle East, and Africa focussing both on arms control measures that might commend themselves to the countries in these areas as being in their own best interest, and those that might profitably be initiated or supported by the United States Government. The basic conclusion is that the goal of finding better ways to restrict the arms competitions that exist or are about to start in the regions in question belongs very high in the hierarchy of U. S. strategic and foreign policy interests. This interest rates alongside the extremely potent U. S. interest in the successful transition of the developing countries into stable and viable societies; and the latter objective is probably unattainable if arms competitions swallow up the margin of resources needed for development that so many of them still lack. The interest also rates as a vital part of the high U. S. interest in reducing the capacity of secondary disputes to erupt into great power war. The more stable the strategic balance in great power relations, the greater the temptation for one of the superpowers to engage in competitive military assistance in areas adjacent to the zones of dominant influence of the other. Thus the potential for intensified arms competition in the developing areas may be growing. A vigorous arms control policy may be necessary in order not to lose ground.

AD-610 206 Div. 32
OTS Prices: HC $1.00/MF $0.50

Princeton Univ., N. J.

TECHNICAL CHANGE, CAPITAL LONGEVITY AND ECONOMIC GROWTH,
by E. Philip Howrey. 16 Dec 64, 24p ERP-RP-9
Grant NSF GS551

Unclassified report

Descriptors: (*Economics, Mathematical models), (*Replacement theory, Economics), (*Distribution (Economics), Consumption), Labor, Commerce, Costs, Money, Life expectancy, Obsolescence theory, Management planning, Social sciences, Optimization.

The specification of a criterion which may be used to determine the optimum longevity of capital has been the subject of some controversy in the literature. The contributions to this problem fall into two distinct categories. One approach to the problem emphasizes micro-economic criteria based on profit maximization or cost minimization. A second approach is concerned with the impact of changes in the longevity of capital on the level and rate of growth of aggregate output and consumption. In this paper these two approaches are compared within the context of a relatively simple macro-economic growth model. Within the context of this model of economic growth, it is found that these two criteria coincide if and only if the rate of interest, which is determined by a zero-pure-profit condition, is equal to the equilibrium rate of growth of output. Two alternative but equivalent conditions for the two criteria to coincide are also described. The analysis suggests that in designing policies oriented toward increasing the level or rate of growth of output and consumption, it is necessary to consider explicitly the relationship between the investment-income ratio and the longevity of capital. Focussing attention on only one or the other of these magnitudes may be misleading within the context of policy formulation. (Author)

AD-610 217 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
FUTURIBLES,
by Bertrand de Jouvenel. Jan 65, 19p P-3045

Unclassified report

Transcript of a lecture given by Bertrand de Jouvenel to RAND's Interdepartmental Seminar on November 30, 1964.

Descriptors: (*Social Sciences, History), (*Political science, History), (*France, Economics).

The lecture of M. Bertrand de Jouvenel concerns particularly the activities of the 'Futuribles' project on 'studies in conjecture,' centered in Paris, France, of which M. de Jouvenel is research director. The international venture wishes to stimulate speculation about likely social and political changes, as is indicated by the word 'Furturibles,' meaning 'possible futures;' the venture is made possible by the Ford Foundation. Other interests of the members of the Futuribles group are the problems arising from social change and the machinery for coping with these problems. 'Futuribles' has obtained essays, from experts in a variety of fields, on such speculations as likely changes in political regimes or the future of transportation, rural society, or the 'City of Science.' Most of the essays were published by 'Sedeis,' the Society for Economic, Industrial and Social Study and Documentation, of which M. de Jouvenel is director. M. de Jouvenel also relates the activities of the French Work-Group, the purpose of which is to speculate on likely economic changes during the period between 1960 and 1985.

AD-610 218 Div. 32, 28
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE JOURNEY-TO-WORK AS A DETERMINANT OF RESIDENTIAL LOCATION,
by John F. Kain. Dec 61, 42p P-2489

Unclassified report

Prepared for presentation at the meeting of the Regional Science Association, New York, Dec 61.

Descriptors: (*Housing, Site selection), Transportation, Costs, Labor, Mathematical models, Statistical analysis, Decision making, Economics.

This study presents some empirical evidence on the manner in which transportation costs influence the household's choice of a residential location. It also describes a residential location model which considers the problem of residential location. This model makes it easier to understand the empirical tests offered in this paper. The central hypothesis, suggested by this and similar models, is that households substitute journey-to-work expenditures for site expenditures. This substitution depends primarily on household preferences for low-density as opposed to high-density residential services.

AD-610 242 Div. 32, 18
OTS Prices: HC $5.00/MF $1.00

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS. APPENDIX I. CASES UNDER THE LEAGUE OF NATIONS.
Dec 64, 177p
Contract ACDA IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science.

Contents:
Controversy between Sweden and Finland over the Aaland Islands, 1920
Conflict between Lithuania and Poland, 1920
The Saar Territory: international administration and the use of an international force, 1920-1935
Albania's territorial dispute with Yugoslavia and Greece, 1921
Partition of Upper Silesia, 1921
Corfu: dispute between Greece and Italy, 1923
Question of Memel, 1919-1924
The Mosul affair: frontier dispute between Turkey and Iraq, 1924-1925
The Greek-Bulgarian crisis, 1925
Convention to improve the means of preventing war, 1931
The Manchurian conflict, 1931-1933
Conflict between Colombia and Peru over Leticia, 1932-1935
Italo-Egyptian War, 1934-1936

AD-610 243 Div. 32, 18
OTS Prices: HC $7.00/MF $1.75

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS, APPENDIX II. CASES UNDER INTER-AMERICAN ORGANIZATIONS AND PROCEDURES.

Dec 64, 346p
Contract ACDA IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science, North America, South America.

Contents:
Pre-war cases
Chaco dispute between Bolivia and Paraguay, 1928-1929 and 1932-1935
Haitian-Dominican Republic dispute, 1937
Post-war cases
Applications of the Inter-American Treaty of Reciprocal Assistance
Cases under the Inter-American Peace Committee
Evaluation of the peace-observation experience of the Organization of American States.

AD-610 244 Div. 32, 18
OTS Prices: HC $8.75/MF $2.75

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS. APPENDIX III. PART I. CASES UNDER THE UNITED NATIONS OR SPECIAL MULTINATIONAL ARRANGEMENTS.
Dec 64, 573p
Contract ACDA IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science.

Contents, Major cases handled by the United Nations:
Independence and territorial integrity of Greece, 1946-1954
Problems of Palestine
Problems relating to Indonesian independence, 1947-1951
Establishment of the independence of Korea
Problem of Kashmir, 1948-
The 1958 Middle East crisis
Problem of Laos, 1959
United Nations presence in Thailand and Cambodia
United Nations operation in the Congo, 1960-1964
West New Guinea (West Irian), 1962-1963
The UN observation mission in Yemen, 1963-
Problem of Cyprus, 1964-

AD-610 245 Div. 32, 18
OTS Prices: HC $6.00/MF $1.50

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS: A STUDY ARISING CHIEFLY OUT OF THE EXPERIENCE OF THE LEAGUE OF NATIONS, THE INTER-AMERICAN SYSTEM, AND THE UNITED NATIONS.
Dec 64, 248p
Contract ACDA/IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science, Cold war, North America, South America, Disarmament.

The study is divided into two phases: (1) an examination of past experience in the conduct of peace-observation and fact-finding missions of the League of Nations, the Organization of American States, the United Nations and multinational arrangements; and (2) an examination of the future character and role of peace-observation arrangements under the United Nations now, in the near future and under conditions of a disarming or disarmed world. It was necessary to include a consideration of methods of peaceful settlement and of peace-keeping in order to relate a peace-observation corps to international military peace-keeping operations in a disarming world. The second phase of the study considers the United Nations Peace Observation Commission as well as a United Nations Peace Observation Corps, or the alternative earmarking of peace-observation units by the various member states of the United Nations, on call for use by the United Nations, as practical and useful arrangements in the light of what might be feasible in terms of the foreseeable political and financial realities.

AD-610 246 Div. 32, 18
OTS Prices: HC $6.00/MF $1.50

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS.
Summary rept. and Summaries of Cases.
1964, 246p
Contract ACDA IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science, Cold war, North America, South America, Disarmament.

This study is concerned with the methods and procedures that have been tried since 1920 in order to prevent threatening situations anywhere in the world from developing into international conflict, or, failing that, to circumscribe the conflict and prevent its spread. The study deals in particular with peace observation (sometimes known as 'fact-finding', 'inquiry on the spot' etc.), whereby the organized international community initiates a third party intervention as early as possible in a threatening situation with a view to permitting calmer judgments to allay the potential or actual conflict. The basic conclusion is that the device has proved its usefulness, even under cold war difficulties, and that it is feasible to proceed to some further strengthening and development of peace-observation as one of the practical and important means of averting the universal dangers inherent in modern warfare.

AD-610 247 Div. 32
OTS Prices: HC $4.00/MF $1.00

Washington Center of Foreign Policy Research, D. C.
THE PEACEKEEPING PROPOSALS OF THE U. S. 'OUTLINE OF BASIC PROVISIONS OF A TREATY OF GENERAL AND COMPLETE DISARMAMENT IN A PEACEFUL WORLD.'
Jul 64, 137p
Contract ACDA GC19

Unclassified report

Descriptors: (*Foreign policy, United States), (*Disarmament, Foreign policy), (*Political science, Disarmament), United Nations, History, United States Government, Arms control, Nuclear weapons, Cold war, Armed Forces (United States), Armed Forces (Foreign).

The first three essays of the report deal with policy means and ends in the environment of a disarming or disarmed world. They explore the interests of the

United States that require protection and enquire into the resources for deterrence and defense that the United States would command apart from what peacekeeping instrumentalities might place at its disposal. The following four essays address themselves to an evaluation of the proposed peacekeeping measures both in terms of their practicability and in terms of their effectiveness as supplements to or substitutes for the armaments that would be eliminated in the process of disarmament. All of the essays deal in varying degrees with highly technical problems, with questions of international law, military organization, the balancing of power process and the like; but the aim of the study is not a technical one. Instead the intention throughout is to probe into the assumptions underlying propositions on the relation between peacekeeping and disarmament and to look into the future on the basis of historical experience and rational theoretical reflection.

AD-610 251 Div. 32, 18
OTS Prices: HC $6.00/MF $1.25

Washington Center of Foreign Policy Research, D. C.
THE FUTURE CHARACTER AND ROLE OF PEACE OBSERVATION ARRANGEMENTS UNDER THE UNITED NATIONS, APPENDIX III, PART 2. CASES UNDER THE UNITED NATIONS OR SPECIAL MULTINATIONAL ARRANGEMENTS.
Dec 64, 234p
Contract ACDA IR34

Unclassified report

Descriptors: (*Warfare, Control), (*United Nations, Arms control), History, Foreign policy, Political science.

Contents:
United Nations cases where peace observation was requested or authorized but never fully implemented
Peach observation cases handled through multinational arrangements
Proposed special United Nations machinery related to peace observation
Evaluation of cases under the United Nations and multinational arrangements.

AD-610 276 Div. 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEW DOCUMENTS OF V. I. LENIN,
by V. I. Lenin. 22 Dec 64, 8p FTD-TT-64-531
TT 65 60982

Unclassified report

Unedited rough draft trans. from Pravda, Moscow (USSR) 1964, no. 113, 22 Apr, p. 1.

Descriptors: (*Foreign policy, USSR), (*Communism, Theory), Disarmament, Warfare, Motion pictures, Industries, Agriculture, Rural areas.

Three excerpts are reproduced from the 44th and 45th volumes of the complete collection of the works of V. I. Lenin. From the 44th volume are remarks that Lenin made at the first Moscow regional agricultural conference, Nov. 29, 1921, and directives on the Soviet motion picture industry, dictated Jan. 17, 1922. From the 45th volume of the Lenin collection are 'Corrections and remarks on the declaration of the Soviet delegation at the Genoa conference, March 23, 1922.' The document purportedly illustrates Lenin's desire for peaceful coexistence of nations having differing social structures and for peaceful settlement of international disputes. The document comments on the declaration of G. V. Chicherin, 'Elements of the first speech at the conference,' made at the first plenary session of the Genoa conference.

AD-610 283 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
BOOK REVIEW: A STUDY OF ECONOMIC GROWTH AND INTERNATIONAL TRADE,
by Egon Neuberger. Jan 65, 4p P-3054

Unclassified report

Book review of a book written by Bo Sodersten, Acta Universitatis Stockholmiensis, Stockholm Economic Studies, New Series V, Stockholm: Almqvist and Wicksell, 1964, 190pp.

Descriptors: (*Reviews, Economics), (*Economics, Theory), Commerce, Mathematical models, Distribution (Economics), Industrial production, Labor, Wages.

The book reviewed is described as an impressive example of successful model building for the purpose of examining rigorously some extremely complex issues of theory and policy. Since growth is introduced as a deus ex machina, the book is said to be a study in international trade theory, and not in the theory of economic growth. Sodersten constructs several algebraic general equilibrium, comparative static models of the two-by-two-by-two variety to explore the effects of various types of economic growth on the terms of trade, the volume of exports and imports, real national income, and income distribution.

AD-610 289 Div. 32
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB,Ohio.
STABLE PEACE GOES WITH BLOOD INTERESTS OF HUMANITY,
by V. I. Lenin. 9 Dec 64, 7p FTD-TT-64-530
TT 65 61001

Unclassified report

Unedited rough draft trans. from Pravda (Moscow) 1964, no. 103(16689) 12 Apr, p. 3.

Descriptors: (*Foreign policy, USSR), (*Communism, Theory), Disarmament, Warfare.

A translation is given of a document by Lenin, purportedly from the 44th volume of the complete collection of his works. This document, written Feb. 24, 1922, is claimed to define the position of the Soviet delegation to a conference in Genoa, the first international conference in which the Soviet Government participated. The Soviet delegation reportedly designed a broad program of peace and friendship between nations, one point of which was an agreement on total disarmament. Comment accompanying this document is to the effect that innate interests of most of humanity require a stable peace, a cessation of world wars.

AD-610 312 Div. 32, 23
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus.
ORTHOGRAPHIC REPRESENTATIONS OF THE ENGLISH PRONUNCIATION AS AN AID IN TEACHING ILA. SUPPLEMENT NO. 1,

by Henry M. Moser, Herbert J. Oyer, and Wallace C. Fotheringham. 1959, 16p
Contract AF19 604 4575
AFCRC TN59 75 Suppl. 1

Unclassified report

Descriptors: (*Speech representation, Training devices), (*Training devices, Air traffic controllers), (*Air traffic controllers, Speech), Language, Education.

A supplement to the report, Orthographic Representation of the English Pronunciation as an Aid in Teaching ILA, is presented (PB-150 248). To the nine languages included in the original report, the present list adds a Greek orthographic spelling of air traffic control words and phrases. This list has not as yet been subjected to the experimental evaluation performed on behalf of the original nine orthographic spellings. (Author)

AD-610 313 Div. 32, 15
OTS Prices: HC $2.00/MF $0.50

Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
AUTOMATIC CLASSIFICATION FOR THE ASTIA MATHEMATICS COLLECTION.
Master's thesis,
by Barry Zimmerman. May 64, 48p MSEE-64-22
Contract Nonr55140

Unclassified report

Descriptors: (*Documentation, Mathematics), (*Subject indexing, Classification), (*Mathematics, Classification), Information retrieval, Automatic, Probability, Programming (Computers).

Information Retrieval of documents based on a series of word descriptors which characterize each document requires the formation of a search description. The user of the library can be greatly aided in the search if he knows which descriptors do not occur together in any document in the file and which descriptors have some relatively high probability of co-occurring within a description. This thesis investigates this absence and probable presence of co-occurence between pairs of descriptors in the approximately 25,000 document Mathematics section of the ASTIA library. This absence and probable presence is revealed by an Exclusive and an Inclusive Stratification program whose results are presented as a two-level descriptor classification system. The results of this classification are measured by a figure which states the probability that the file contains documents each of which is formed by choosing any two descriptors from on Inclusive Group. Another measure presented is the reduction in the number of possible descriptions of any length. (Author)

AD-610 340 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

METHOD OF SEEKING WORDS IN A DICTIONARY,
by K. I. Kurbakov and R. V. Smirov. 23 Dec 64, 5p FTD-TT-64-481
TT 65 61034

Unclassified report

Unedited rough draft trans. of Russian patent 155,670, appl. no. 776076/26-24, 28 Apr 62, 2p.

Descriptors: (*Dictionaries, Information retrieval), (*Information retrieval, Computers), Machine translation, Programming (Computers), USSR.

33. Transportation

AD-609 958 Div. 33
OTS Prices: HC $3.00/MF $0.75

Operations Research Center, Mass. Inst. of Tech., Cambridge.
THE STOCHASTIC BEHAVIOR OF TRAFFIC ON A TWO-LANE ROAD.
Technical rept. no 9,
by Pieter Jacob Weeda. Nov 64, 53p
Contract DA31 124ARO D209, Projs. 20011501B704, DSR5217
AROD 968 38

Unclassified report

This rept. also includes Fundamental Investigations in methods of Operations Research.
Master's thesis.

Descriptors: (*Traffic, Operations research), (*Operations research, Traffic), (*Stochastic processes, Traffic), Queueing theory, Mathematical models, Velocity, Passenger vehicles, Monte Carlo method.

The main emphasis is placed on the stochastic behavior of a single traffic stream. Cars are divided into a finite number of discrete free speed classes. A car is moving on its free speed, when it is free from interaction with other cars. For the remaining part of its travel time it is driving on the speed forced upon it by the leaders of queues with slower free speed. The queues, that build up among the cars, that successively pass slow-moving cars, are approximated by steady-state queues. A set of equations is established relating the mean number of cars per mile of each free speed class and the mean number of queue leaders per mile of each class. These equations contain implicitly the relation between the free speed distribution of cars on the road and the speed distribution of leaders. For four different free speed distributions and for different values of the total density of the traffic stream, the distributions obtained are the speed distribution of leaders, the instantaneous speed distribution of cars passing a fixed point on the road and the distribution of speeds of a single car with given free speed during its travel time on the road.

How To Use New Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown below.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
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*COMBUSTION
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A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

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(TT 65 60700)
AD-609 928 DIV. 2
AMMETSOC T R 444
(TT 65 60701)
AD-609 929 DIV. 2
AMMETSOC T R 439
(TT 65 60831)
AD-610 098 DIV. 26
AMMETSOC T R 440
(TT 65 60824)
AD-610 113 DIV. 2
AMMETSOC T R 430
(TT 65 60826)
AD-610 115 DIV. 2
AMMETSOC T R 428
(TT 65 60827)
AD-610 116 DIV. 2
AMMETSOC T G 221
(TT 65 60828)
AD-610 118 DIV. 25
AMMETSOC T R 437
(TT 65 60829)
AD-610 119 DIV. 2

•AF19 628 4019
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 227
AD-609 943 DIV. 2

•AF19 628 4019 GRANT
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 232
(AFCRL 69 992)
AD-610 221 DIV. 8

•AF19 628 414
ARIZONA UNIV TUCSON DEPT OF CHEMISTRY
(AFCRL 69 989)
F AD-610 102 DIV. 4

•AF19 628 500
LINCOLN LAB MASS INST OF TECH LEXINGTON
(ESD TDR69 985)
AD-610 021 DIV. 8
LL TR 369
(ESD TDR69 366)
AD-610 068 DIV. 25

•AF30 602 2488
CENTRAL RADIO PROPAGATION LAB NATIONAL BUREAU OF STANDARDS BOULDER COLO
NBS 8439
(RADC TDR64 425)
A AD-610 033 DIV. 8

•AF30 602 2979
MICROWAVE LAB STANFORD UNIV CALIF
ML 1224
(RADC TDR64 469)
AD-610 066 DIV. 8

•AF30 602 2989
AIRBORNE INSTRUMENTS LAB INC DEER PARK N Y
(RADC TDR64 480)
AD-610 317 DIV. 25

•AF30 602 3244
MOTOROLA INC PHOENIX ARIZ
(RADC TDR64 436)
AD-609 999 DIV. 8

•AF30 602 3266
MOTOROLA INC PHOENIX ARIZ
AD-609 998 DIV. 8

•AF30 602 3338
AUTOMETRIC FACILITY RAYTHEON C ALEXANDRIA VA
(RADC TDR64 391 V1)
F AD-610 188 DIV. 20

AUTOMETRIC FACILITY RAYTHEON CO ALEXANDRIA VA
(RADC TDR64 391 V2)
F AD-610 263 DIV. 2

•AF30 602 3348
SPERRY GYROSCOPE CO GREAT NECK N Y RADIATION DIV
ED 9287 0500 1
(RADC TDR64 348)
AD-610 074 DIV. 8

•AF30 602 3396
GENERAL ELECTRIC CO WEST LYNN MASS
(RADC TDR64 412)
F AD-610 104 DIV. 7

•AF30 602 3440
ELECTRO-OPTICAL SYSTEMS INC PASADENA CALIF
EOS 9180 Q 1
(RADC TDR64 442)
AD-610 106 DIV. 10

•AF33 615 1014
CONDUCTRON CORP ANN ARBOR MICH
D 9210 72 T80 110
AD-610 082 DIV. 25

•AF33 615 1061
MELFOUR ENGINEERING CO SUTTONS (AY MICH
BEC IR 613
AD-610 332 DIV. 17
BEC IR 620
AD-610 333 DIV. 17

•AF33 615 1121
DEFENSE METALS INFORMATION CENTER COLUMBUS OHIO
DMIC 209
AD-610 280 DIV. 26

•AF33 615 1169
ITT RESEARCH INST CHICAGO ILL
(APL TR64 138)
AD-610 296 DIV. 1

•AF33 615 1326
MICHIGAN UNIV ANN ARBOR AIRCRAFT PROPULSION LAB
(ARL 64 150)
AD-609 994 DIV. 25

•AF33 615 1547
RADIO CORP OF AMERICA LANCASTER PA
AD-609 966 DIV. 7

•AF33 615 1576
ROCKETDYNE CANOGA PARK CALIF
ROCKETDYNE R 9670 3
AD-609 926 DIV. 12

•AF33 615 1583
DELCO-REMY DIV GENERAL MOTORS CORP ANDERSON IND
AD-609 984 DIV. 7

•AF33 615 1938
ELECTRONIC DEFENSE LABS MOUNTAIN VIEW CALIF
EDL M811
AD-610 097 DIV. 8

•AF33 616 7661
POLYTECHNIC INST OF BROOKLYN N Y
(ARL 64 177)
AD-609 976 DIV. 9

•AF33 616 7726
STANFORD ELECTRONICS LABS STANFORD UNIV CALIF
SEL 64 062
AD-610 262 DIV. 17

•AF33 616 7806
FIRESTONE FLIGHT SCIENCES LAB CALIF INST OF TECH PASADENA
GALCIT SM 64 19
(ARL 64 178)
AD-610 078 DIV. 25

•AF33 616 7893
KOPPERS CO INC MONROEVILLE PA
(APL TDR64 78)
AD-610 168 DIV. 14

•AF33 616 8269
GENERAL ELECTRIC CO SCHENECTADY N Y
AD-610 012 DIV. 25

•AF33 616 8283
PURDUE UNIV LAFAYETTE IND
SCHOOL OF ELECTRICAL ENGINEERING PUSEE TR EE 62 1
AD-610 215 DIV. 5

•AF33 616 8393
LABORATORY FOR INSULATION RESEARCH MASS INST OF TECH CAMBRIDGE
LIR TR 199
(ML TR64 400)
AD-610 100 DIV. 30
LIR TR 195
AD-610 101 DIV. 25

•AF33 657 10330
BATTELLE MEMORIAL INST COLUMBUS OHIO
(ASD TDR62 728 P2)
AD-610 303 DIV. 1

•AF33 657 10462
AIRBORNE INSTRUMENTS LAB INC DEER PARK N Y
(AMRL TR64 97)
F AD-610 258 DIV. 30

•AF33 657 10933
PURDUE RESEARCH FOUNDATION LAFAYETTE IND
(ARL 64 112)
AD-610 147 DIV. 25

•AF33 657 10939
LABORATORY FOR INSULATION RESEARCH MASS INST OF TECH CAMBRIDGE
LIR TR 199
(ML TR64 400)
AD-610 100 DIV. 30

•AF33 657 11310
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
(ARL 64 216)
F AD-610 031 DIV. 25

•AF33 657 11647
HORIZONS INC CLEVELAND OHIO
(SEG TR64 64)
F AD-609 950 DIV. 24

•AF33 657 11721
GARRETT CORP PHOENIX ARIZ AIRESEARCH MFG DIV
(APL TDR64 103)
AD-610 043 DIV. 12

•AF33 657 7874
TORONTO UNIV (ONTARIO)
(ARL 64 130)
AD-609 899 DIV. 10

•AF33 657 8179
DARTMOUTH COLL HANOVER N H
(ARL 64 178)
AD-609 910 DIV. 25

•AF33 657 8599
RIAS INC BALTIMORE MD
AD-610 197 DIV. 30

•AF33 657 8611
DATA CORP DAYTON OHIO
FR 64 2
(AL TDR64 211)
AD-609 949 DIV. 24

•AF33 657 8772
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(FDL TR64 159)
AD-610 146 DIV. 25

•AF33 657 9476
GOODYEAR AEROSPACE CORP AKRON OHIO
(AMRL TR64 117)
F AD-610 284 DIV. 6

•AF33 657 9771
HUGHES AIRCRAFT CO NEWPORT BEACH CALIF
AD-610 266 DIV. 8

•AF33 657 9962
PRINCETON UNIV N J
(ARL 64 179)
AD-609 977 DIV. 30

•AF39 602 2937
TECHNICAL RESEARCH GROUP EAST BOSTON MASS
(RADC TDR64 334)
F AD-610 037 DIV. 8

•AF49 638 1206
RIAS INC BALTIMORE MD
RIAS TR 64 15
(AFOSR 64 1787)
AD-609 991 DIV. 30

•AF49 638 1248
WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA
AD-610 361 DIV. 25

•AF49 638 1290
POLYTECHNIC INST OF BROOKLYN N Y
(AFOSR 64 2088)
AD-610 139 DIV. 25
(AFOSR 64 2087)
AD-610 140 DIV. 25

•AF49 638 1336
NORTHROP SPACE LABS HAWTHORNE CALIF
NSL 64 168 1
(AFOSR 65 0033)
F AD-610 167 DIV. 25

•AF49 638 1363
STANFORD RESEARCH INST MENLO PARK CALIF
AD-610 001 DIV. 2

•AF49 638 1383
COORDINATED SCIENCE LAB UNIV OF ILLINOIS URBANA
CSL R 238
AD-610 099 DIV. 15

•AF49 638 986 GRANT
LABORATORY FOR ELECTROSCIENCE RESEARCH NEW YORK UNIV N Y
NYU TR 400 99
(AFOSR 64 1664)
AD-609 980 DIV. 30

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4349 PR
AD-609 904 DIV. 4
RM 4193 PR
AD-610 067 DIV. 9
RM 4270 PR
AD-610 287 DIV. 9
RM 4385 PR
AD-610 319 DIV. 15
RM 4341 PR
AD-610 337 DIV. 13

•AF49 638 944 GRANT
CALIFORNIA UNIV BERKELEY
(AFOSR 65 0068)
F AD-610 160 DIV. 25

•AF61 052 388
WEIZMANN INST REHOVOTH (ISRAEL)
(AFCRL 64 1022)
AD-610 360 DIV. 25

•AF61 052 393
ISRAEL INST OF TECH HAIFA
(ARL 236)
AD-610 080 DIV. 25

•AF61 052 490
INNSBRUCK UNIV (AUSTRIA)
(AFCRL 64 1013)
AD-610 024 DIV. 8

•AF61 052 529
OSLO UNIV (NORWAY) INST OF
THEORETICAL METEOROLOGY
(AFCRL 64 1014)
F AD-610 127 DIV. 2

•AF61 052 604
KIRUNA GEOPHYSICAL OBSERVATORY
(SWEDEN)
(AFCRL 64 868)
AD-610 293 DIV. 2

•AF61 052 691
DAVIES (EDWARD) CHEMICAL LAB
UNIV COLL OF WALES ABERYSTWYTH
(AFCRL 65 11)
AD-610 311 DIV. 4

•AF61 052 701
UPPSALA UNIV (SWEDEN)
(ARL 65 25)
A AD-610 079 DIV. 25

•AT30 1 2663
LAMONT GEOLOGICAL OBSERVATORY
PALISADES N Y
CU 16 64AT30 1 2663
AD-610 047 DIV. 2

•DA ARO 031 1246582
ILLINOIS UNIV URBANA ENGINEERING
EXPERIMENT STATION
(AROD 4832 2)
AD-610 321 DIV. 28

•DA ARO 031 1246588
MICHIGAN UNIV ANN ARBOR COLL
OF LITERATURE SCIENCE AND
THE ARTS
ORA 06689
AD-610 198 DIV. 30

•DA01 0210RD12341Z
ROHM AND HAAS CO HUNTSVILLE
ALA
ROHM S 53
AD-609 982 DIV. 30

•DA04 495AMC458Z
HELIODYNE CORP LOS ANGELES
CALIF
AD-610 096 DIV. 9

•DA11 022AMC168A
GENERAL TECHNOLOGY CORP ELGIN
ILL
TRX 1
AD-609 920 DIV. 26
TRX 2
AD-609 921 DIV. 26
TRX 3
AD-609 922 DIV. 30

•DA11 0220RD2917
GENERAL TECHNOLOGY CORP ELGIN
ILL
AD-610 032 DIV. 25

•DA11 190ENG32
DARTMOUTH COLL HANOVER N H
DEPT OF CIVIL ENGINEERING
(CRREL SR59)
AD-610 143 DIV. 13

•DA11ORD022 3108
IIT RESEARCH INST CHICAGO
ILL
IITRI B18382 7
AD-610 358 DIV. 17

•DA18 035AMC141A
LABORATORIES FOR RESEARCH
AND DEVELOPMENT FRANKLIN
AINST PHILADELPHIA PA
Q 82227 2
AD-609 969 DIV. 28

•DA18 035AMC298A
REACTION MOTORS DIV THIOKOL
CHEMICAL CORP DENVILLE N
J
AD-610 128 DIV. 3

•DA18 064AMC242A
AIRESEARCH MFG CO LOS ANGELES
CALIF
CP 303
AD-610 268 DIV. 30

•DA18 064AMC36A
OHIO STATE UNIV RESEARCH FOUNDATION
COLUMBUS
AD-610 163 DIV. 16

•DA18 108AMC161A
CALIFORNIA UNIV BERKELEY
AD-609 963 DIV. 16

•DA18 108AMC249A
PHILCO RESEARCH LABS NEWPORT
BEACH CALIF
U 2705
F AD-610 264 DIV. 9

•DA20 018ORD24883
WYANDOTTE CHEMICALS CORP MICH
AD-610 223 DIV. 14

•DA23 072ORD1687
MIDWEST RESEARCH INST KANSAS
CITY MO
AD-610 030 DIV. 4

•DA28 043AMC00073E
COORDINATED SCIENCE LAB UNIV
OF ILLINOIS URBANA
CSL R 241
AD-610 149 DIV. 8

•DA28 043AMC00073E
COORDINATED SCIENCE LAB UNIV
OF ILLINOIS URBANA
CSL R 238
AD-610 099 DIV. 15

•DA30 069ORD2787
UNION CARBIDE RESEARCH INST
TARRYTOWN N Y
AD-609 974 DIV. 14

•DA30 069ORD3690
NEW YORK UNIV N Y SCHOOL
OF ENGINEERING AND SCIENCE
(WAL TR401302 6)
AD-609 905 DIV. 17

•DA31 124ARO D155
STANFORD ELECTRONICS LABS
STANFORD UNIV CALIF
SEL 64 062
AD-610 262 DIV. 17

•DA31 124ARO D207
RIAS BALTIMORE MD
AD-610 002 DIV. 4

•DA31 124ARO D209
OPERATIONS RESEARCH CENTER
MASS INST OF TECH CAMBRIDGE
(AROD 968 38)
AD-609 958 DIV. 33

•DA36 034ORD3081
J G ENGINEERING RESEARCH ASSOCIATES
CBALTIMORE MD
(AD 298 063 SUPERSEDED)
AD-610 064 DIV. 25

•DA36 034ORD3296
BUDD CO PHILADELPHIA PA
F AD-610 081 DIV. 26

•DA36 039AMC00034E
ELECTRICAL ENGINEERING RESEARCH
LAB CORNELL UNIV ITHACA
N Y
EERL 27
AD-609 978 DIV. 5
EERL 31
AD-610 306 DIV. 8

•DA36 039AMC00094E
ELECTRICAL ENGINEERING RESEARCH
LAB CORNELL UNIV ITHACA
N Y
EERL 29
AD-610 319 DIV. 8

•DA36 039AMC01497
NATIONAL CO INC MALDEN MASS
AD-610 020 DIV. 8
AD-610 302 DIV. 8

•DA36 039AMC01968E
SPRAGUE ELECTRIC CO NORTH
ADAMS MASS
AD-610 022 DIV. 8

•DA36 039AMC01979E
GENERAL ELECTRIC CO OWENSBORO
KY
AD-610 169 DIV. 8

•DA36 039AMC02195E
TEXAS A AND M UNIV COLLEGE
STATION
TAMU REP 64 19F
(AFCRL 64 938)
F AD-610 107 DIV. 2

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
RLE 425
AD-609 911 DIV. 25

•DA36 039AMC03634E
LINDEN LABS INC STATE COLLEGE
PA
AD-609 991 DIV. 26

•DA36 039SC79968
RCA DEFENSE ELECTRONIC PRODUCTS
CAMDEN N J
AD-610 191 DIV. 8

•DA36 039SC86741
AEROPROJECTS INC WEST CHESTER
PA
AD-609 939 DIV. 26

•DA36 039SC87376
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
RLE 425
AD-609 911 DIV. 25

•DA44 009AMC910T
TYCO LABS INC WALTHAM MASS
AD-610 269 DIV. 4

•DA44 009ENG4775
LINK DIV GENERAL PRECISION
BINGHAMPTON N Y
LINK 645
F AD-610 044 DIV. 2

•DA44 177AMC1197
CORNELL AERONAUTICAL LAB INC
BUFFALO N Y
CAL SB 1898 S 1
(TRECOM TR64 53)
AD-610 029 DIV. 1

•DA44 177AMC69T
PRINCETON UNIV N J
AER 692
(TRECOM TR64 54)
AD-610 040 DIV. 1

•DA44 177AMC888T
FLIGHT SAFETY FOUNDATION INC
NEW YORK
(TRECOM TR63 31A)
AD-609 938 DIV. 1
(TRECOM TR63 31B)
AD-609 939 DIV. 1

•DA44 177AMC892T
MISSISSIPPI STATE UNIV STATE
COLLEGE
(TRECOM TR64 58)
AD-609 972 DIV. 30

•DA49 146XZ272
NATIONAL ENGINEERING SCIENCE
CO PASADENA CALIF
SN 168
(DASA 1543)
F AD-609 957 DIV. 9

•DA49 193MD2063
INDIANA UNIV BLOOMINGTON
AD-610 180 DIV. 16
AD-610 181 DIV. 16
AD-610 182 DIV. 16

•DA49 193MD2238
MARYLAND UNIV COLLEGE PARK
AD-610 155 DIV. 16

•DA49 193MD2281
IIT RESEARCH INST CHICAGO
ILL
IITRI L6021 1
AD-610 397 DIV. 16

•DCA12
WESTERN ELECTRIC CO INC NEW
YORK BELL TELEPHONE LABS
INC
F AD-609 925 DIV. 9

•GRANT DA ARO D31 1246988
MICHIGAN UNIV ANN ARBOR COLL OF LITERATURE SCIENCE AND THE ARTS
ORA 06689
AD-610 200 DIV. 30

•GRANT NSF GP2914
IONOSPHERE RESEARCH LAB PENNSYLVANIA STATE UNIV UNIVERSITY PARK
IRL 227
AD-609 949 DIV. 2

•NAS8849
RIAS INC BALTIMORE MD
RIAS TR 64 15
(AFOSR 64 1787)
AD-609 991 DIV. 30

•NAS8 9289
BROWN ENGINEERING CO INC HUNTSVILLE ALA
BROWNENG R 128
AD-609 969 DIV. 12

•NIH RG3723
JOHNS HOPKINS UNIV BALTIMORE MD
AD-610 199 DIV. 15

•NONSR89167
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
AD-610 000 DIV. 19

•NONSR89983
GOODRICH (B F) AEROSPACE AND DEFENSE PRODUCTS AKRON OHIO
AD-610 189 DIV. 6

•NOBSR91206
DUMONT (ALLEN B) LABS DIV FAIRCHILD CAMERA AND INSTRUMENT CORP CLIFTON N J
SI 9874
AD-609 967 DIV. 8

•NONS78396
HYDRONAUTICS INC LAUREL MD
HYDRO TR 001 13
AD-609 906 DIV. 9

•NONS88948
BATTELLE MEMORIAL INST COLUMBUS OHIO
(SSC 169)
AD-610 039 DIV. 28

•NONS90268
OLIN MATHIESON CHEMICAL CORP NEW HAVEN CONN
AD-609 992 DIV. 14

•NONS90344
SOUTHWEST RESEARCH INST SAN ANTONIO TEX
AD-610 338 DIV. 9

•NONS90417
GENERAL ELECTRIC CO PLEASANTON CALIF
GEST 2092
AD-609 953 DIV. 8

•NONR122421
MICHIGAN UNIV ANN ARBOR COLL OF LITERATURE SCIENCE AND THE ARTS
ORA 06689
AD-610 200 DIV. 30

•NONR122421 GRANT
MICHIGAN UNIV ANN ARBOR COLL OF LITERATURE SCIENCE AND THE ARTS
ORA 06689
AD-610 198 DIV. 30

•NONR122423
MICHIGAN UNIV ANN ARBOR COLL OF LITERATURE SCIENCE AND THE ARTS
ORA 03106 18 T
AD-610 076 DIV. 20

•NONR128805
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LAB UNIV OF UTAH SALT LAKE CITY
MDL 8 10
AD-609 934 DIV. 8

•NONR183426
ILLINOIS UNIV URBANA
AD-609 983 DIV. 28

•NONR183440
ILLINOIS UNIV URBANA
F AD-609 994 DIV. 16

•NONR184110
LABORATORY FOR INSULATION RESEARCH MASS INST OF TECH CAMBRIDGE
LIR TR 195
AD-610 101 DIV. 25

•NONR184174
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF GEOLOGY AND GEOPHYSICS
AD-610 126 DIV. 2

•NONR185816
PRINCETON UNIV N J
ERP RP 8
AD-610 084 DIV. 15
ERP RM 68
AD-610 089 DIV. 32

•NONR185827
FRICK CHEMICAL LAB PRINCETON UNIV N J
AD-610 369 DIV. 25

•NONR186619
MALLINCKRODT CHEMICAL LABS HARVARD UNIV CAMBRIDGE MASS
AD-610 261 DIV. 25

•NONR214900
VANDERBILT UNIV NASHVILLE TENN SCHOOL OF MEDICINE
F AD-610 063 DIV. 16

•NONR22028
CALIFORNIA INST OF TECH PASADENA
CIT 85 29
AD-610 013 DIV. 9

•NONR22948
MICROWAVE LAB STANFORD UNIV CALIF
ML 1244
AD-610 190 DIV. 8

•NONR22953
STANFORD UNIV CALIF
AD-610 034 DIV. 15

•NONR22967
HIGH ENERGY PHYSICS LAB STANFORD UNIV CALIF
HEPL 326
AD-610 055 DIV. 20

•NONR229603
MISSOURI SCHOOL OF MINES AND METALLURGY ROLLA
AD-610 194 DIV. 4

•NONR23962
CALIFORNIA UNIV LOS ANGELES
UCLA DE 64 49
AD-610 028 DIV. 9

•NONR23973
CALIFORNIA UNIV LOS ANGELES GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
WMSI WP 56
AD-609 973 DIV. 26
WMSI WP 62
AD-610 135 DIV. 26

•NONR296200
WAYNE STATE UNIV DETROIT MICH
AD-610 083 DIV. 32

•NONR298705
MICHIGAN STATE UNIV EAST LANSING
RM 124 J6 4
AD-609 960 DIV. 15

•NONR26648
LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y
CU 16 64AT30 1 2663
AD-610 047 DIV. 2

•NONR26659
COLUMBIA UNIV NEW YORK
CU 98 64 NONR 266(89)MS
AD-610 088 DIV. 15
CU 50 63 NONR 266(89)MS
AD-610 089 DIV. 15
CU 99 64 NONR266(89)
AD-610 090 DIV. 15

•NONR26667
COLUMBIA UNIV NEW YORK DEPT OF CIVIL ENGINEERING AND ENGINEERING MECHANICS
CU 1 64 ONR(67) CE
AD-610 007 DIV. 29

•NONR26672
NEVIS LABS COLUMBIA UNIV IRVINGTON-ON-HUDSON N Y
NEVIS 127
AD-610 065 DIV. 20

•NONR27T029
CARNEGIE INST OF TECH PITTSBURGH GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION
ONR RM 129
AD-610 192 DIV. 20

•NONR301300
MCGILL UNIV MONTREAL (QUEBEC)
AD-610 129 DIV. 29
AD-610 129 DIV. 29

•NONR318900
HYDRONAUTICS INC LAUREL MD
HYDRO TR 011 6
F AD-610 219 DIV. 1

•NONR321200
STANFORD RESEARCH INST MENLO PARK CALIF
F AD-610 095 DIV. 30

•NONR339012
RAVEN INDUSTRIES INC SIOUX FALLS DAK
RAVEN 2169
F AD-610 192 DIV. 2

•NONR347300
THIOKOL CHEMICAL CORP ELKTON MD
E98 62
(N62 13681)
AD-610 290 DIV. 10
E149 61
AD-610 298 DIV. 10
E47 62
(N62 10906)
AD-610 260 DIV. 10

•NONR351100
WAYNE STATE UNIV DETROIT MICH
AD-609 962 DIV. 4

•NONR356000
PHILCO RESEARCH LABS NEWPORT BEACH CALIF
U 2958
AD-609 931 DIV. 2

•NONR363000
ENTELEK INC NEWBURYPORT MASS
F AD-610 093 DIV. 29

•NONR370700
RIAS INC BALTIMORE MD
F AD-610 964 DIV. 25

•NONR372900
MECHANICAL TECHNOLOGY INC LATHAM N Y
MTI 64TR63
AD-610 194 DIV. 25

•NONR380000
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA
AD-610 087 DIV. 25

•NONR389704
DARTMOUTH COLL HANOVER N H DEPT OF PHYSICS AND ASTRONOMY
F AD-610 042 DIV. 25

•NONR390200
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF
GDA DBE64 069
AD-610 962 DIV. 25

•NONR391100
ANDREWS UNIV BERRIEN SPRINGS MICH DEPT OF MATHEMATICS
AD-610 109 DIV. 15

•NONR394900
OPERATIONS RESEARCH INC SILVER SPRING MD
ORI TR 289
AD-610 129 DIV. 23

•NONR401009
JOHNS HOPKINS UNIV BALTIMORE MD
AD-610 156 DIV. 15
AD-610 157 DIV. 15
AD-610 158 DIV. 15

•NONR401009 GRANT
JOHNS HOPKINS UNIV BALTIMORE MD
AD-610 159 DIV. 15

•NONR40918
RUTGERS UNIV NEW BRUNSWICK N J
AD-610 041 DIV. 26

•NONR405400
TRACOR INC AUSTIN TEX
TRACOR 68 103 U
AD-609 959 DIV. 9

•NONR408700
MARTIN MARIETTA CORP BALTIMORE MD
MND 3176
F AD-610 151 DIV. 7

•NONR417200
UNION CARBIDE PLASTICS CO BOUND BROOK N J
AD-610 036 DIV. 14

•NONR422201
CALIFORNIA UNIV SANTA BARBARA
AD-610 094 DIV. 25

•NONR430900
HUNTER COLL OF THE CITY UNIV OF NEW YORK
AD-610 079 DIV. 28

•NONR440800
STANFORD RESEARCH INST MENLO PARK CALIF
S AD-610 046 DIV. 17

•NONR443900
LING-TEMCO-VOUGHT INC DALLAS TEX
LTV 00.967
F AD-610 190 DIV. 6

•NONR448600
GENERAL ELECTRIC CO CINCINNATI OHIO
AD-609 985 DIV. 14

•NONR491300
TECHNICAL RESEARCH GROUP MELVILLE N Y
TRG 015 FR
F AD-609 959 DIV. 9

•NONR496700
LITTON SYSTEMS INC ST PAUL MINN
LSI 2650
AD-610 109 DIV. 30

•NONR55140
MOORE SCHOOL OF ELECTRICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA
MSEE 64 22
AD-610 313 DIV. 32

•NONR56235
BROWN UNIV PROVIDENCE R I
AD-609 975 DIV. 9

•NONR59510
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

AD-294 904 Div. 1, 16
OTS Prices: HC $2.00/None

Aviation Safety Engineering and Research, Phoenix, Ariz.
MECHANISMS OF INJURY IN MODERN LIGHTPLANE CRASHES: A STATISTICAL SUMMARY OF CAUSATIVE FACTORS,
by Richard G. Pearson and Mildred H. Piazza.
Nov 62, 43p AvCIR-62-13
Contract DA44 177TC802, Task 9R95 20 001 01
TRECOM TR62 83

Unclassified report

Descriptors: (*Aviation accidents, Statistical data), (*Aviation injuries, Aircraft seats), (*Aircraft seats, Failure (Mechanics)), Tables, Safety harness, Pilot seats, Impact shock, Effectiveness, Pilots.

The study was undertaken to evaluate the interrelationship between primary impact variables, seat and belt tiedown effectiveness, and injuries sustained by occupants of 342 lightplanes involved in spin-stall crashes or collisions with the ground while in flight. The data were obtained during the period 1953-1960. Contrary to the earlier findings, seat failure now occurs more frequently than belt failure. The curve of belt failure plotted as a function of impact velocity does not accelerate as rapidly as that from the earlier data, whereas the seat-failure curves from the two sets of data are comparable. Since injuries are found to be more severe when seats fail than when belts fail, there is a suggestion that seat tiedown improvements may not have kept pace with improvements in seat belt manufacture and installation. Overall, however, when tiedown is considered to be effective, injuries are less severe for the more recent data. Injury severity was found to increase little as a function of impact velocity, but did increase rapidly as a function of angle of impact. (Author)

Patent 3,161,272 Div. 1

SELF-ENERGIZING CLUTCH.
Army-assigned Patent,
by Robert J. Malchodi. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Clutches), (*Clutches, Patents), (*Aircraft canopies, Clutches), Drive shafts, Solenoids.

The clutch is utilized in aircraft canopy removing. The clutch is self-energized upon rotation of a power drive shaft and releasable by solenoid action. The parts of the clutch are arranged to form a compact unitary device.

2. Astronomy, Geophysics and Geography

NCH-100 005 Div. 2, 30, 32

Committee on Oceanography, NAS-NRC, Washington, D. C.
ECONOMIC BENEFITS FROM OCEANOGRAPHIC RESEARCH.
Special rept.
1964, 50p
NAS-NRC 1228

Unclassified report

Order from National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. 20418, as pub. 1228, $2.00.

Descriptors: (*Oceanology, Economics), (*Economics, Oceanology), Scientific research, Costs, Budgets, Feedback, Oceans, Food, Minerals, Recreation, Public health, Transportation, Weather forecasting, Research program administration, National defense.

This report attempts to estimate some of the future economic benefits that could result from oceanographic research, and to compare them with the cost of doing the research. These benefits are of two kinds: annual savings in costs of goods and services, and increases in production. The estimates are crude and the future times when the benefits may be realized are uncertain; the areas are confined to where it is believed significant economic improvements can be attained within the next fifteen years. The purpose is three-fold: (1) to obtain some idea of how much the expenditures planned for the national oceanographic program can contribute to the economic well-being of the United States; (2) to provide a very rough basis for comparing the anticipated economic results from oceanographic research with those that might be attained through other expenditures of the same funds; and (3) to suggest a conceptual and computational framework for estimating the usefulness of investment of public funds in this field, which could be employed by other interested persons who may make quite different judgments about the numerical values that have been used.

PB-166 590 Div. 2, 6, 12, 30
OTS Prices: HC $2.00/MF $0.50

Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
AUTOMATIC PROCESSING OF NIMBUS INFRARED RADIOMETER DATA,
by G. E. Martin and L. Rubin. Jul 64, 38p
WB-MSL 28

Unclassified report

Descriptors: (*Meteorological satellites, Infrared scanning), (*Infrared scanning, Meteorological satellites), (*Radiometers, Meteorological satellites), Satellites (Artificial), Weather forecasting, Infrared photography, Aerial photography, Cloud cover, Telemeter systems, Digital systems, Data processing systems, Programming (Computers), Meteorology, Meteorological instruments, Infrared equipment.

Procedures for processing by computer digitized radiometer data from the Nimbus satellite are described. Step by step methods are presented showing how the raw incoming signal is formatted into computer words, geographically located, and mapped in terms of physical units. Descriptions of computer program formats and a discussion of location errors are presented to aid in the use and evaluation of this meteorological tool. (Author)

PB-166 591 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Philco Research Labs., Newport Beach, Calif.
ABSORPTION BY THE 7620 ANGSTROM OXYGEN BAND.
Final rept.,
by Darrell E. Burch, David A. Gryvnak, and Richard R. Patty. 15 Nov 64, 48p U-2908
Contract Cwb10758

Unclassified report

Descriptors: (*Oxygen, Absorption spectrum), (*Absorption spectrum, Oxygen), (*Atmosphere, Optical properties), Controlled atmospheres, Temperature, Pressure, Nitrogen, Solar radiation, Absorption, Solar spectrum, Band spectrum, Spectrum analyzers, Integral equations, Selection rules.

Several dozen spectra have been obtained for samples of O2 and O2 + N2 with path lengths as large as 469 meters and pressures as high as 2 atmospheres; other samples were also studied in a different absorption cell having a maximum path of 32.9 meters and a maximum pressure of 13.6 atmospheres. The strengths and widths of many of the lines have been determined, and the validity of the Lorentz line shape at high and low pressures is discussed. Also included are extensive tables of the integrated absorptance over about 50 different intervals within the band for 27 representative samples. (Author)

PB-166 592 Div. 2, 1, 30
OTS Prices: HC $5.00/MF $1.25

Travelers Research Center, Inc., Hartford, Conn.
USE OF DERIVED PREDICTORS IN THE STATISTICAL PREDICTION OF 3- AND 7-hr CEILING AND VISIBILITY.
Final rept.,
by J. E. MacMonegle. 31 Oct 64, 196p
TRC-7411-144
Contract Cwb10704

Unclassified report

See also AD-606 899.

Descriptors: (*All-weather aviation, Weather forecasting), (*Weather forecasting, All-weather aviation), (*Statistical analysis, Weather forecasting), Ceiling, Visibility, Meteorological parameters, Terminal flight facilities, Probability, Mathematical prediction, Tables, Meteorology.

The study reported here is an attempt made to improve forecast accuracy by including variables felt to be more representative of the physical processes affecting ceiling and visibility. Such variables, termed derived predictors, include: time changes, space gradients, space averages, advection terms, and combinations of two or more variables believed to be jointly related to the predictand variables. Two prediction models, employing simple predictors and simple plus derived predictors, are applied to the same test samples (from Kennedy International and Washington National airports) and verification scores are computed. The results indicate that no significant overall improvement in forecast skill is achieved by using derived predictors. In addition, the ability of the REEP technique to forecast rare events, i.e., low values of ceiling and visibility, is investigated. The results were-at best-marginal. Further studies are recommended to improve the method of applying the REEP technique to the problem of predicting rare events. A plan is offered. (Author)

PB-166 612 Div. 2
OTS Prices: HC $13.00/MF $4.25

Boeing Co., Seattle, Wash.
SUMMARY OF SOLAR RADIATION OBSERVATIONS. TABULAR SUMMARIES,
by R. A. Atlas and B. N. Charles. Dec 64, 998p
D2-90577-2

Unclassified report

A Cooperative Program of the Office of Climatology, Weather Bureau, Washington, D. C.

Descriptors: (*Solar radiation, Attenuation), (*Tables, Solar radiation), Atmosphere, Optical properties, Transport properties, Electromagnetic waves, Meteorological parameters, Visibility, Sun, Light, Cloud cover, Climatology, Statistical analysis, Meteorology.

Data on solar radiation received by 27 stations of the U. S. Weather Bureau over a nominal period of 11 years has been statistically summarized. The work was accomplished as a cooperative effort of the U. S. Weather Bureau Office of Climatology and The Boeing Company Aero-Space Division. This report includes the tabular summaries that contain frequency distribution of atmospheric transmissivity stratified by months and seasons for various weather conditions of cloud cover, sunshine, visibility, and precipitation. Linear correlation coefficients between transmissivity and visibility, cloud cover, and solar elevation angle are also included. PB-166 613, Solar Radiation Summaries, describes the basic data, defines statistical relations and procedures used, and lists the tabular summaries delivered to the U. S. Weather Bureau. (Author)

PB-166 613 Div. 2
OTS Prices: HC $1.00/MF $0.50

Boeing Co., Seattle, Wash.
SUMMARY OF SOLAR RADIATION OBSERVATIONS,
by R. A. Atlas and B. N. Charles. Dec 64, 19p
D2-90577-1

Unclassified report

Prepared in cooperation with Office of Climatology, Weather Bureau, Washington, D. C.

Descriptors: (*Solar radiation, Attenuation), Atmosphere, Optical properties, Transport properties, Electromagnetic waves, Meteorological parameters, Visibility, Sun, Light, Cloud cover, Climatology, Statistical analysis, Meteorology.

A statistical summary of solar radiation data received by 27 stations of the U. S. Weather Bureau over a nominal period of 11 years is described. The work was accomplished as a cooperative effort of the U. S. Weather Bureau Office of Climatology and The Boeing Company Aero-Space Division. This report describes the basic data, defines statistical relations and procedures used,

and lists the tabular summaries delivered to the U. S. Weather Bureau. The data summaries are contained in PB-166 612, Summary of Solar Radiation Observations, Tabular Summaries, and consist of 995 pages. These summaries include frequency distribution of atmospheric transmissivity stratified by months and seasons for various weather conditions of cloud cover, sunshine, visibility, and precipitation. Linear correlation coefficients between transmissivity and visibility, cloud cover, and solar elevation angle are also included. (Author)

PB-166 617 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept. for Nov 64,
by Glyndon L. Lynde. Nov 64, 13p
Contract Cwb10704

Unclassified report

See also AD-606 899.

Descriptors: (*Weather forecasting, Data processing systems), (*Data processing systems, Weather forecasting), Programming (Computers), Meteorological parameters, Mathematical prediction.

Contents: Implementation testing of meteorological processing techniques; Digifax programming project; Aviation approach zone weather studies project; Medium-period terminal forecasting project.

3. Chemical Warfare Equipment and Materials

Patent 3,161,192 Div. 3, 29

AIR-CONDITIONED PROTECTIVE GARMENT AND AIR-SUPPLY-AND-CONDITIONING APPARATUS FOR THE SAME.
Army-assigned Patent,
by Mark E. McCormack. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective clothing), (*Protective clothings, Patents), (*Air conditioning equipment, Protective clothing), Tanks (Containers), Air, Liquefied gases, Oxygen, Heat exchangers, Pyrophoric materials, Ventilation.

The air-impervious protective garment completely encloses the wearer. Associated with the garment is a tank of liquid air or oxygen, and combined with it is a heat exchanger operated by pyrophoric material to condition the liquid air or oxygen for breathing and body warming purposes after the temperature of the air has been raised sufficiently by passage through an ambient air-heated evaporator to vaporize the same, but not sufficiently for ultimate use.

4. Chemistry

AD-426 877 Div. 4
OTS Prices: HC $1.00/None

Washington Univ., Seattle.
BICYCLIC SMALL RING COMPOUNDS.
Final technical rept., Oct 60-Oct 62,
by Kenneth B. Wiberg. Oct 62, 7p
Grant DA ORD31 124 61G41
AROD 2966 1

Unclassified report

Descriptors: (*Polycyclic compounds, Chemical properties), (*Cyclopentenes, Chemical properties), Synthesis (Chemistry), Substitution reactions, Molecular structure, Bibliographies.

A summary is given of work involving the preparation and properties of the following compounds and their derivatives: bicyclo(1.1.0)butane, bicyclo(1.1.1)pentane, bicyclo(2.1.1)hexane, bicyclo(3.1.1)heptane, and cyclopropene. Details of the investigations were published in the open literature, a bibliography of which is included.

Patent 3,160,469 Div. 4, 14

BISCARBAMATE-FORMALDEHYDE ADDUCTS FOR WRINKLE RESISTANCE FINISHES.
Agriculture-assigned Patent,
by Sidney L. Vail and John D. Reid. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Textiles), (*Textiles, Patents), Finishes and finishing, Formaldehyde, Amino acids, Esters, Catalysts.

Cellulosic textile material is made wrinkle resistant by impregnating it with an aqueous solution that contains 5 to 20 percent of the reaction product of formaldehyde and a biscarbamate and from 0.5 to 5 percent by weight of an acid catalyst and heat curing the material. The biscarbamate may be methylenebis(methylcarbamate), methylenebis(ethyl carbamate), ethylidinebis(ethyl carbamate), or ethylenebis(ethyl carbamate).

Patent 3,161,462 Div. 4, 25

ELEMENT 96 AND COMPOSITIONS THEREOF.
AEC-assigned Patent,
by Glen T. Seaborg. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Curium), (*Curium, Patent), Synthesis (Chemistry), Curium compounds, Salts, Isotopes, Atomic structure, Atomic properties, Chemical properties.

Element 96 and the isotopes and salts of element 96 are claimed. Element 96 values are obtained from a solution containing them by contacting the solution with a lanthanide rare earth fluoride precipitate carrier for the element and separating the carrier precipitate and associated element 96 values from the solution.

Patent 3,161,467 Div. 4, 26, 32

DIRECT METHOD FOR THE PRODUCTION OF HIGH-ANALYSIS PHOSPHORIC ACID.
TVA-assigned Patent,
by Travis P. Hignett, Archie V. Slack, John M. Potts, and Larrabee D. Hand, Jr. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Phosphoric acid), (*Phosphoric acid, Patents), (*Fertilizers, Production), Phosphates, Sulfuric acid, Quenching (Cooling), Separation.

The process includes acidulating phosphate rock with strong sulfuric acid; holding the resulting acidulate in an insulated container for a period of about 20 to 60 minutes; quenching the resulting hot material in wash liquor from the end step of a countercurrent extraction system; and recovering a product acid containing up to about 60 percent P2O5 which is strong enough to be shipped or used directly without further concentration in the production of a fertilizer material.

5. Communications

No Entries

6. Detection

Patent 3,160,769 Div. 6

MAGNETOSTRICTIVE TRANSDUCER.
Navy-assigned Patent,
by Frank R. Abbott. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transducers), (*Transducers, Patents), (*Magnetostrictive elements, Transducers), (*Underwater sound equipment, Transducers), Electrical impedance, Semiconductors, Amplifiers, Electromagnetic properties, Electroacoustic transducers.

The transducer has low electrical impedance which facilitates its coupling to semiconductor amplifiers, inductive phase compensators, and other low impedance components. The reversible magnetostrictive transducer has a closed magnetic loop with relatively low reluctivity.

Patent 3,160,846 Div. 6, 30

ELLIPTICAL COMPUTER.
Navy-assigned Patent,
by Walter R. Gustafson, William H. McMillen, James R. Rounding, Jr., and Leo Shore. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Analog computers), (*Analog computers, Patents), Computers, Fire control computers, Integrators (Computers), Sound ranging, Sonar equipment, Submarines, Detection, Position finding, Underwater tracking, Antisubmarine fire control system, Antisubmarine aircraft.

The elliptical computer of the analog type is operative to process data received from explosive echo ranging systems for application to an airborne integrated display system installed in an anti-submarine warfare aircraft. The ellipse is defined by having a sonobuoy as one focus thereof and an offset explosive charge as the other focus. Localization is accomplished by generating two or more intersecting ellipses having a single sonobuoy as a common focus and having the submarine target located at one of the ellipse intersections.

Patent 3,160,849 Div. 6

AUTOMATIC TARGET SIGNAL TRACKER.
Navy-assigned Patent,
by John C. Munson. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sonar sound analyzers), (*Sonar sound analyzers, Patents), (*Target discrimination, Sonar sound analyzers), Automatic, Underwater tracking, Targets, Sonar signals, Signal-to-noise ratio, Correlators, Circuits, Gates (Circuits), Wiring diagrams, Sonar, Submarines.

The target signal tracker is for maintaining a gate in coincidence with a target signal which exists in a heavy noise background, such as is encountered in a passive underwater detection system. It is used on a submarine. The automatic target tracker automatically follows a correlation signal from a correlator output. This minimizes problems connected with the human operator.

Patent 3, 160,880 Div. 6, 8

VELOCITY SATURATION CONTROL FOR TRACK NETWORKS.
Navy-assigned Patent,
by Ramon H. Aires. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Voltage regulators), (*Voltage regulators, Patents), (*Radar tracking, Voltage regulators), Radar equipment, Control, Circuits, Coupling circuits, Servomotors, Gyroscopes, Integrators, Electrical networks, Tracking.

A system is disclosed for eliminating saturation voltages from the control circuit of a radar tracking system associated with an aircraft and a gyro. The system includes a radar receiver, an antenna, a servo motor coupled to the receiver output and the antenna, a loop coupling the antenna to the receiver, a gyroscope, an integrating network, a limiter network and elements supplying a positive biasing voltage and a negative bias ing voltage to diodes in the limiter network.

Patent 3,160,883 Div. 6

RADAR SIGNAL DENSITY ANALYSIS CIRCUIT.
Navy-assigned Patent,
by Edward Buyer, Robert H. Edmonds, and Jesse R. Karp. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar equipment), (*Radar equipment, Patents), (*Radar, Countermeasures), Radar jamming, Radar signals, Broadband, Radio-frequency oscillators, Display systems, Cathode ray tubes, Radar pulses, Density, Circuits.

The system is for displaying radar signal density as a function of frequency over a wide band. A panoramic superheterodyne receiver is disclosed employing a swept local oscillator for monitoring a wide band of frequencies. As the panoramic receiver sweeps through the band a single pulse from each of the various frequencies in the band at which an enemy is operating radar is selected, limited, stretched, and integrated and applied to the vertical deflection plates of a horizontally swept cathode ray tube. The cathode ray tube then displays a signal which has an amplitude proportional to the radar pulse density.

Patent 3,160,885 Div. 6

HEIGHT FINDING RADAR.
Navy-assigned Patent,
by William B. Bernard. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radar scanning), (*Radar scanning, Patents), (*Height finding, Radar scanning), Radar equipment, Radar antennas, Waveguides.

The scanning system is for a height finding radar. The antenna has two waveguides positioned so as to receive and transmit energy from each other, one being a rotary waveguide feed cylinder and the other being a prism. The antenna is mechanically scanned in a vertical direction and electronically scanned in a horizontal direction.

Patent 3,161,375 Div. 6, 12

SOLAR CELL LOOK-ANGLE DETECTING SYSTEM.
Navy-assigned Patent,
by Justin M. Ruhge. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Terminal guidance), (*Terminal guidance, Patents), (*Detection, Terminal guidance), Solar cells, Guided missile components, Guided missile targets, Guided missile warheads, Telemeter systems, Homing devices.

The device is applicable to the field of missile guidance and operation, for obtaining information relative to the interception of a missile with its target through the utilization of a radiation emitted by the target and impinging on the missile. The non-recoverable device is capable of indicating the look-angle prior to, and at the time of fuse operation of a directional warhead and transmitting this information to the ground through a telemetering system, a component of which may, if desired, be disposed in the target for relaying the information to the ground.

Patent 3,161,760 Div. 6, 22

TARGET SELECTOR AND COMPARATOR CIRCUITS.
Navy-assigned Patent,
by Noel C. Olmstead. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Circuits, Patents), (*Target designators, Circuits), Fire control systems, Firing circuits, Voltage, Gun directors, Detection, Tracking.

A multiple target gun fire-control system is disclosed wherein targets are selected on the basis of the closing-time between the gun and the target. A circuit evaluates the closure time of a plurality of known targets as represented in electrical potentials and compares these with the closure time of new targets whereby rearrangements of director-tracker and gun assignments may be made to provide portection against targets of greatest threat.

Patent 3,161,870 Div. 6, 8

SYSTEM FOR INCREASING THE DETECTION RANGE OF A GROUP OF SEARCH RADARS.
Army-assigned Patent,
by Peter H. Pincoffs. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Search radar), (*Search radar, Patents), (*Antenna radiation patterns, Search radar), Radar tracking, Detection, Target acquisition, Defense systems, Radar receivers, Radar transmitters, Site selection, Radar reflections, Mixers (Electronic).

The system increases the detection range of a group of search radars. It includes a plurality of radar transmitters for radiating signals of different frequencies and positioned at different radar sites, receiver systems positioned at each of the sites, each of the systems having a number of receivers equal to the number of sites. The outputs of all the receivers are added to provide a composite echo signal.

7. Electrical Equipment

CAPE-1132 Div. 7, 20

Oak Ridge National Lab., Tenn.
TRANSISTORIZED, REGULATED HIGH-VOLTAGE POWER SUPPLIES/Q-2291A/.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Power supplies, Specifications), (*Health physics instrumentation, Power supplies), Voltage, Transistors, Portable.

Drawings (7) are presented for h-v power supplies that are capable of operating over a wide range of primary supply voltages and a wide range of loads with a regulation factor seldom achieved in precision laboratory supplies. The supplies are used with portable survey units requiring high-voltage supplies delivering moderately high currents with good voltage regulation. The output voltages (500 v, 900 v, 1200 v, and 1400 v) are used with health physics survey instruments. Units are hermetically sealed in 1 19/32 in. x 1 11/32 in. x 2 11/32 in. cases which weigh 3.5 oz. They deliver 140 Mw of power with an over-all efficiency of 60 to 70%. Output voltages change less than 0.05% with a change from no load to full load. When loaded to half capacity, the primary supply voltage can be decreased from 12 to 6 v without producing more than a 0.05 change in the output voltage; therefore, they may be powered from either 6- or 12-v primary supplies. (AEC abstract)

NCH-100 002 Div. 7, 13

Illinois Univ., Urbana. Engineering Experiment Station.
PERFORMANCE OF THREE DUCTED ELECTRIC HEATING SYSTEMS IN A SPLIT LEVEL RESIDENCE,
by James H. Healy and Murray N. Patterson.
May 64, 45p TR 9

Unclassified report

Order from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin, v. 61, no. 85, $1.00.

Descriptors: (*Buildings, Heating plants), (*Heaters, Electrical equipment), (*Furnaces, Electrical equipment), Pumps, Ducts, Temperature, Humidity, Heating elements, Thermostats, Electric insulation, Air conditioning equipment.

This publication summarizes the installed performance of three types of residential electric heating units incorporating a ducted warm air distribution system. The units investigated included a central electric furnace, an air source heat pump, and individual branch duct heaters. The test facility was a fully instrumented modern split-level residence located in a geographical area which experienced approximately 6,000 degree-days in a heating season. The residence was furnished and occupied by a family. Operating characteristics showing the variation of heat output to energy input as a function of outdoor temperature are reported, and comparisons of power consumption are made between the heat pump and resistance systems. In addition, the effect of outdoor temperature and humidity on the frequency of the heat pump defrost cycles are reported. Data relating to comfort and temperature unbalance between rooms and differences between elevations within a room are reported. In general, the comfort maintained by all three electric heating units was excellent, and no one type of unit excelled in overall performance. However, some differences between units existed, and the most important of these are discussed. (Author)

Patent 3,160,529 Div. 7, 22

DEFERRED ACTION BATTERY.
Navy-assigned Patent,
by Herbert E. Lawson, Jr. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Primary cells), (*Primary cells, Patents), (*Projectiles, Primary cells), Electrodes, Electrolytes, Liquids, Centrifugal fields, Spinning.

The one-fluid, deferred-action type battery is used in electrically operated projectiles. The battery has a plurality of electrode cell units which are disposed parallel to the longitudinal axis of the projectile so as to permit the electrolyte to be maintained in contact with the electrodes by the action of centrifugal force caused by spinning of the projectile during flight.

Patent 3,160,531 Div. 7, 14

GALVANIC CELL ELECTRODE.
Navy-assigned Patent,
by William C. Spindler. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cathodes (Electrolytic cell)), (*Cathodes (Electrolytic cell), Patents), Electrodes, Electrolytic cells, Glass, Vanadium compounds, Oxides, Phosphous compounds, Sulfides.

The glass cathode is for use in a voltaic cell. It consists of from 80 to 20 weight percent of V_2O_5-P_2S_5 melted together to form a homogeneous vitreous material.

Patent 3,160,805 Div. 7

BATTERY CHARGER.
Navy-assigned Patent,
by Wilmer M. Lawson, Jr. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Battery chargers), (*Battery chargers, Patents), Rectifiers, Silicon, Voltage dividers, Transistors, Circuits.

The battery charger has a pair of input and output terminals, a silicon controlled rectifier, a resistance voltage divider, a unijunction transistor, a resistance-capacitor charging circuit and a transistorized over-voltage trip circuit.

Patent 3,161,452 Div. 7, 12

MOUNTING ADAPTER FOR ELECTRICAL CONNECTORS.
Army-assigned Patent,
by Calvin R. Salter and Kenneth H. Pascoe.
15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Adapters), (*Adapters, Patents), (*Electric connectors, Adapters), Control systems, Guided missile components, Miniature electrical equipment, Design.

The adapter is for miniature electrical connectors used in the electronic control system of a missile. The adapter includes a ferrule, a nut and an insert. The ferrule has a body portion, with a lip portion on one end and a sleeve portion on the other end. The sleeve portion is adapted to be inserted through a hole in a mounting plate and have the inserted end flanged into securing

relation with the mounting plate. The nut has a collar which cooperates with the lip portion of the ferrule to define a rotary connection, and the insert is inserted into a receiver portion of the nut and secured thereto.

Patent 3,161,546 Div. 7, 31

CONTINUOUS FEED PRIMARY BATTERY.
Navy-assigned Patent,
by Ernest B. Yeager, Harry J. Dietrick, and Romeo R. Witherspoon. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Batteries and components), (*Batteries and components, Patents), (*Submarines, Batteries and components), Propulsion, Primary cells, Mercury alloys, Alkali metal alloys, Electrodes, Electrolytes, Sodium compounds, Hydroxides, Oxygen, Carbon, Sea water, Water-activated batteries.

The battery is used in submarine propulsion. The battery has a primary cell composed of a liquid alkali metal amalgam, in a preferred embodiment being sodium amalgam, an alkali hydroxide electrolyte, in the preferred embodiment being sodium hydroxide, and a cathodic gas, in the preferred embodiment being oxygen, used in the presence of carbon. The anode comprises a vertical metal electrode with a flow of liquid amalgam directed down the surface, the metal being such as to be wet by the amalgam but not attacked by it. The cathode involves the use of an air-cell type carbon electrode with the cathodic gas, for example oxygen, introduced through the rear of the electrode. The cell generates its own electrolyte and can use sea water.

Patent 3,161,736 Div. 7, 12

OMNIDIRECTIONAL SWITCH.
AEC-assigned Patent,
by Robert A. Randall and Donald F. Wilkes.
15 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric switches), (*Electric switches, Patents), (*Spacecraft, Electric switches), (*Acceleration, Electric switches), Gimbals, Gravity.

The switch is utilized in a space vehicle. It is suspended by a gimbal system so that the switch seeks and senses the vector sum of all applied linear accelerations due to gravity. A housing contains a gimbaling arrangement which supports the gravimetric condition sensing switch assembly in such a manner that it is insensitive to orientation in the housing.

8. Electronics and Electronic Equipment

AD-443 662 Div. 8, 25
OTS Prices: HC $2.00/None

Lincoln Lab., Mass. Inst. of Tech., Lexington.

BEAM PULSE HEATING,
by E. Silverman. 13 Apr 64, 30p LL-TR-351
Contract AF19 628 500
ESD TDR64 46
Unclassified report

Rept. on Proj. DEFENDER.

Descriptors: (*Electron bombardment, Heating), (*Heating, Electron bombardment), (*Thermionic emission, Electron bombardment), Radiofrequency power, Electromagnetic pulses, Electron beams, Metals, Surface temperature, Vaporization, Electron tubes, Monitors, Photoelectric pyrometers, Bremsstrahlung, Intensity, Photomultipliers, Thermodynamics.

Experiments are described which investigated the single-pulse, instantaneous surface temperatures of metallic materials subjected to high-intensity, pulsed electron-beam bombardment. The metallic vapors liberated from these bombarded areas may be deposited on critical surfaces within a high-power microwave tube and therby limit peak power output. A photoelectric pyrometer to monitor the instantaneous temperature is described, and the difficulties with the bremsstrahlung intensity extending within the wavelength limits of the photomultiplier instrumentation are discussed. The predicted and measured surface temperatures for the metals investigated are compared. (Author)

Patent 3,160,795 Div. 8, 12

MISSILE LAUNCH DETECTION CIRCUIT.
Army-assigned Patent,
by Kenneth E. Aune. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Circuits, Patents), (*Launching, Circuits), (*Guided missile safety, Launching), Rectifiers, Resistors, Electric relays, Capacitors, Electric switch, Control, Semiconductor devices.

The circuit is used to indicate to ground personnel if a missile has been properly launched and is functioning properly. The circuit includes a power source, a switch, a capacitor, a resistor, a controlled rectifier, and a relay. An umbilical cord is provided to sever the connection between the power source and common ground from the remainder of the relay circuit upon launching of the missile.

SB-444 Suppl. 1 Div. 8

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
ELECTRONIC MINIATURIZATION.
Price list, selective bibliography of Government research repts. and translations for Dec 61-Jul 64.
1964, 19p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Miniature electronic equipment, Bibliographies), (*Bibliographies, Miniature electronic equipment), (*Microminiaturization (Electronics), Bibliographies), Miniature electron tubes, Scientific research, Reports, Molecular electronics, Modules

(Electronics), Subminiature electronic equipment, Subminiature electron tubes, Patents.

Lists 284 foreign and domestic reports on electronic miniaturization added to the OTS collection during the period December 1961 through July 1964. Covers research on microelectronics, molecular electronics in miniaturization, micro-modules, microminiaturization, subminiaturization, and miniaturization. It also includes government-owned patents available for license.

9. Fluid Mechanics

Patent 3,160,005 Div. 9, 30

MULTI-STING MACH NUMBER SENSOR.
Navy-assigned Patent,
by Bob C. Miller, Edward L. Graham, and Jerry D. Walter. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Machmeters), (*Machmeters, Patents), Supersonic flow, Compressible flow, Shock waves, Fluid flow, Flowmeters, Conical bodies, Fluid mechanics, Flight speed indicators.

The device may be adapted for use in a wind tunnel or on an aircraft or missile which is in supersonic flight. A plurality of spatially arranged small-angle cones are used to create a plurality of shock waves. Elements associated with a centrally located cone are used to determine the position of the shock waves created by the other cones from which the Mach number of a free fluid stream may be determined.

PB-166 616 Div. 9
OTS Prices: HC $3.00/MF $0.75

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CROSS-FLOW CALIBRATION AT TRANSONIC SPEEDS OF FOURTEEN PERFORATED PLATES WITH ROUND HOLES AND AIRFLOW PARALLEL TO THE PLATES,
by William L. Chew. Jul 55, 66p
Contract AF18 600 1233
AEDC TR54 65

Unclassified report

Declassified 5 Aug 58.

Descriptors: (*Transonic flow, Flat plate models), (*Flat plate models, Porosity), Gas flow, Fluid flow, Boundary layer, Thickness, Pressure, Velocity, Calibration, Two-dimensional flow, Aerodynamic configurations, Fluid dynamic properties, Aerodynamic slots, Suction slots, Wind tunnels, Interference, Data, Fluid mechanics, Surface area, Area suction.

Cross-flow calibration tests on fourteen perforated plates with round holes were conducted in the Transonic Model Tunnel of the Propulsion Wind Tunnel Facility. The results indicate the effect of varying the wall open area, hole size, and plate thickness on the cross-flow characteristics of perforated plates with stream flow parallel to the plates. Perforated plates with 1/16-in. diameter holes and 1/16-in. plate thickness were varied in opening ratio from 5.2 percent to 33 percent. Perforated plates with an open-area ratio of 22.5 percent and hole diameters of 1/4 in., 1/2 in., and 1 in. were investigated with thicknesses varying from 1/16 in. to 1 in. The stream Mach number was varied from 0.75 to 1.175. The results show that the slope of the cross-flow characteristic curve increased slightly as the opening ratio was increased from 5.2 percent to 33 percent for outflow velocities greater than 3 percent. Results of tests on perforated plates with an open-area ratio of 22.5 percent and variation in hole diameter from 1/4 in. to 1 in. show that the pressure differential across the plate increased as the plate thickness was decreased for a constant outflow. (Author)

10. Fuels and Combustion

No Entries

11. Ground Transportation Equipment

Patent 3,161,248 Div. 11

VEHICLE WHEEL SUSPENSION.
Army-assigned Patent,
by Theodoric B. Edwards. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Suspension devices), (*Suspension devices, Patents), (*Vehicle wheels, Suspension devices), Supports, Vehicle chassis components.

The vehicle wheel suspension is an improvement over the assembly described in patent No. 2,926,047. The system includes torsion suspension elements mounted on the chassis or on a frame which is in fixed radial relation to the hub, including torsion rollers exerting pressure outwardly against the inner surface of the rim; and torque transmission elements between the hub of the wheel and the rim which operates independently of the suspension system and regardless of the relative radial position of the hub and the rim.

12. Guided Missiles

AD-296 349 Div. 12
OTS Prices: HC $3.00/

Lockheed Missiles and Space Co., Sunnyvale, Calif.
ATTITUDE CONTROL SYSTEMS: AN ANNOTATED BIBLIOGRAPHY.
Rept. for 1957 - May 62,
comp. by Helen M. Abbott. Aug 62, 71p
LMSC SB-62-26, LMSC 3-77-62-20

Contract AF04-647 787
N63 17088

Unclassified report

Descriptors: (*Attitude control systems, Bibliographies), (*Bibliographies, Attitude control systems), Satellites (Artificial), Stabilization systems, Solar wind, Torque, Celestial mechanics, Orbital trajectories, Flight control systems, Aeronautics, Reviews.

This bibliography contains 155 selected references pertaining to attitude control systems of satellites. Information gained from these references presented state-of-the-art capabilities in the area of stabilization of earth satellites. Also pertinent to this subject is, Solar Radiation Pressure Torques and Geomagnetic Effects on Satellite Orbits: An Annotated Bibliography, W. L. Hollister, LMSC-SB-61-66, Nov 1961. The coverage of this search included references from 1957 through May 1962 obtained from the following sources: LMSC card catalog, book and periodical collection, Armed Services Technical Information Agency - ASTIA, Aerospace Engineering Abstracts, Battelle Technical Review, Proceedings of American Astronomical Society, Metal Progress, Engineering Index, Science Abstracts, and Solid Propellant Information Agency - SPIA Search completed May, 1962. Author)

Patent 3,160,021 Div. 12, 26

ROTARY DRIVE CONTROL MECHANISM.
Navy-assigned Patent,
by Ralph F. Hereth. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Drives, Patents), (*Hoists, Drives), (*Guided missile launchers, Hoists), Control, Remote control systems, Drive sprockets, Hydraulic equipment.

The mechanism is for controlling the length of the 'pay-out' stroke of a sprocket-driven chain used in a missile launcher. The mechanism is part of a sequentially-operated hydraulic complex in which the sequential operations are hydraulically initiated and accomplished in response to automatically relayed information. It is used for controlling the missile launcher chain hoist to produce long and short strokes of the chain.

Patent 3,160,098 Div. 12

MISSILE SEPARATION SYSTEM.
Army-assigned Patent,
by William A. Schulze and Gustav A. Kroll.
8 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missiles), (*Guided missiles, Patents), (*Staging, Guided missiles), Explosive actuators, Attitude control systems, Hydraulic systems, Separation.

The separation system is for a missile having two or more sections connected by explosive bolts. The missile has a source of fluid pressure for an attitude control system. The expulsion units of the separation system are integrated into the existing fluid system of the missile.

Patent 3,160,289 Div. 12, 11

MISSILE TRANSPORTER ERECTOR.
Army-assigned Patent,
by Bernard I. Leefer. 8 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Transporter-erectors), (*Transporter-erectors, Patents), (*Guided missile (Surface-to-surface), Transporter-erectors), Ground support equipment, Tractors, Trailers.

The missile transporter erector is designed for the transportation and erection of missiles of the JUPITER type. A tractor provides motive power for a trailer and missile and power for operating a winch during erection. A launch pad is attached to the rear of the trailer. A winch and accessories are used to raise the missile from the trailer to the firing position. No other vehicles are needed for erection of the missile.

Patent 3,161,132 Div. 12, 14, 26

EPOXY RESIN STRUCTURAL FILLER MATERIALS.
Navy-assigned Patent,
by Cletus J. Siebert and Wilfred G. Burgan, Jr.
15 Dec 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Packing materials), (*Epoxy plastics, Packing materials), (*Packing materials, Guided missile warheads), (*Guided missile warheads, Packing materials), Guided missile (Air-to-surface), Bombs, Warheads.

The filler material is used in a missile which is dropped from an aircraft and has a forward guidance section, an intermediate payload section and a propulsion section. The payload section has a missile skin or casing within which a bomb is carried. An epoxy resin material is used between the bomb and casing to take up shock and the like.

13. Installations and Construction

CAPE-1126 Div. 13, 7

Sandia Corp., Albuquerque, N. Mex.
GALVANOMETER PEDESTAL-SMALL/SAND-50/.
Engineering materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Galvanometers, Mounting brackets), Mechanical drawings, Metal plates; Steel, Vibration.

Drawings (16) are presented for a pedestal used to isolate light-beam galvanometers from vibrations found in a nonindustrial building to a degree that makes it practical to use high-sensitivity galvanometers at distances of four meters from their scales. The design consists of a large mass suspended from a frame. The

mass is a two-deck assembly of flat steel plate. The upper deck is polished to afford a flat working surface. The plate is 2 in. thick, 34 in. sq, and weighs 655 lb. The lower deck is suspended from the frame by diagonal springs between the frame and the lower deck. It is a plate 4 in. thick, 30 in. sq, and weighs 1060 lb. The 54 in. high frame is constructed of 11 gauge steel plate and steel angles 2 1/2 in. x 2 1/2 in. x 1/4 in. Four 8 3/4 in. high x 6 in. in dia. oil-filled dashpots positioned between the floor of the frame and the lower deck damp out motion imparted to the mass. The suspended mass can be bolted to the frame to facilitate transportation. The pedestal weighs 1800 lb. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

NCH-100 008 Div. 13

Illinois Univ., Urbana. Engineering Experiment Station.
PUMPING AND STORAGE FACILITIES IN WATER SUPPLY SYSTEMS. PROCEEDINGS, SANITARY ENGINEERING CONFERENCE NO. 6, URBANA, ILLINOIS, JANUARY 28-29, 1964.
Circular.
Nov 64, 124p C-83
Unclassified report

Jointly sponsored with the Illinois State Department of Public Health.
Order from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin, v. 62, no. 33, $2.00.

Descriptors: (*Water supplies, Storage), (*Pumps, Performance (Engineering)), (*Sanitary engineering, Symposia), Centrifugal pumps, Propeller pumps, Storage tanks, Operation, Costs, Distribution, Design.

Contents: Water pumping and storage today and tomorrow; Pumps; In-line booster stations; Direct pumping; Pumping with elevated storage; Pumps--Past and present; Ground and elevated storage; Design criteria for distribution system storage; Sanitary requirements of storage; Water tank maintenance; Water storage facilities--Factors affecting cost and selection; Automatic controls for fixed speed pumps; Controls for variable speed pump systems using internal combustion engines.

14. Materials (Non-Metallic)

OTR-108 Div. 14, 17
OTS Price: $0.50

National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
VOLATILE CORROSION INHIBITORS.
Jan 65, 25p Unclassified report

Descriptors: (*Corrosion inhibition, Materials), (*Coatings, Corrosion inhibition), Corrosion, Antioxidants, Salts, Plastic coatings, Storage, Moisture, Containers, Reviews, Metals, Abstracting, Vapors, Packing materials, Steel.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. Recent government R and D on volatile corrosion inhibitors (VCI) has generally proceeded along three lines: extension of tests defining the protective value of these materials for longer storage periods to steel equipment, tolerance of various nonferrous materials and finishes toward tarnishing or corrosion by these materials, and effectiveness of exterior packaging materials in extending use of these inhibitors to more severe exposures to water vapor and liquid. Volatile corrosion inhibitors in the form of salts, dissolved in oils, or coated on paper within enclosed shipment parcels or storage spaces offer improved corrosion protection to bare steel while it is in a ready condition for withdrawal and immediate use.

Patent 3,160,552 Div. 14, 4

CELLULOSIC PULPS COMPRISING CROSSLINKED XANTHATE CEREAL PULPS AND PRODUCTS MADE THEREWITH.
Agriculture-assigned Patent,
by Charles R. Russell, Russell A. Buchanan, and Carl E. Rist. 8 Dec 64 Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Paper), (*Paper, Patents), (*Fiberboard, Patents), Cellulose, Fibers (Natural), Cereals, Polysaccharides, Polyvinyl alcohol, Adhesives.
The pulp is for making paper and fiberboard products. The paper has high wetrub resistance and is grease-proof. The cellulosic pulp-cereal pulp blends contain at least 4 percent based upon the dry weight of cellulose fibers and up to about 100 percent thereof of a cereal pulp material such as crosslinked xanthates of a cereal flour such as whole wheat, bran, or refined white flour, or a crosslinked xanthate of such polysaccharides as starch, cellulose, dextrin, dextran, or guar gum, or a crosslinked xanthate of other polyhydroxy compounds such as polyvinyl alcohol.

SB-535 Div. 14, 4

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
TITANIUM CARBIDES AND COMPOUNDS.
Price list, selective bibliography of government research repts. and translations for Aug 58-Mar 64.
1964, 28p Unclassified report

Available free from the Clearinghouse.
Supplement to CTR-350.

Descriptors: (*Bibliographies, Titanium compounds), (*Titanium compounds, Carbides), (*Carbides, Bibliographies), Borides, Chlorides, Fluorides, Hydrides, Iodides, Nitrides, Oxides, Ferroelectric materials, Dielectric properties, Costs.

Lists 456 domestic and foreign references on titanium carbides and compounds added to the OTS collection during the period August 1958 through March 1964. Includes research on titanium carbides and some other compounds of titanium such as: borides, chlorides, fluorides, hydrides, iodides, nitrides and oxides; dielectric and ferroelectric properties of titanium compounds; production and applications.

15. Mathematics

AD-416 348 Div. 15, 25
OTS Prices: HC $2.00/None

University Coll., Cork (Ireland).

LINEAR BOUNDARY-VALUE PROBLEMS, I: THE TORSION OF AN IRREGULAR POLYGON.
Technical rept. no. 1,
by Patrick M. Quinlan. Jun 63, 33p
Grant AF EOAR62 43
AFOSR 5161

Unclassified report

Descriptors: (*Boundary value problems, Theory), (*Torque, Boundary value problems), Elasticity, Stresses, Geometric forms, Beams (Structural), Harmonic analysis, Fourier analysis, Series, Integral equations, Complex variables, Simultaneous equations, Potential theory, Mechanics.

This paper is the first in a series presenting a new exact method of solving linear boundary value problems, of elliptic type, for regions bounded externally and, possibly, internally by polygons - problems previously attacked in some simplified cases, by finite-difference and relaxation methods. The torsion problem is chosen as the most suitable medium to develop and exhibit the method, when the boundary conditions do not involve derivatives. A subsequent paper on the corresponding elastic plate problems will remove this limitation. The method is based on representing the boundary effects by a series of exponentially decaying harmonics associated with each edge of the polygon. At the outset it is developed for the basic polygon - a solid polygon without re-entrant angles - the boundary conditions being satisfied by equating to zero the corresponding Fourier Sine harmonics.

PB-166 619 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING. PART III. COMPUTATIONAL ALGORITHM OF THE REVISED SIMPLEX METHOD,
by George B. Dantzig. 26 Oct 53, 12p RM-1266
AD 114 136

Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Linear programming, Matrix algebra), (*Matrix algebra, Linear programming), (*Iterative methods, Linear programming), Numerical methods and procedures, Mathematical models, Transformations (Mathematics), Inequalities, Mathematical programming, Optimization.

The computational procedure is given for the revised simplex method for minimizing a linear form under linear inequality restraints. (Author)

16. Medical Sciences

SB-540 Div. 16

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
ELECTROSLEEP.
Price list, selective bibliography of government research repts. and translations.
1964, 6p

Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Electrotherapy, Sleep), (*Sleep, Electrotherapy), (*Bibliographies, Electrotherapy), Medical equipment, Hypertension, Mental disorders, Surgical techniques.

Lists 28 foreign and domestic reports on electrically induced sleep therapy of arterial hypertension, in treatment of mental disorders, in treatment of skin disorders; electronarcosis in surgery and the post operative period; electrosleep apparatus and devices.

17. Metallurgy

AD-277 774 Div. 17, 26
OTS Prices: HC $3.00/None

McDonnell Aircraft Corp., St. Louis, Mo.
FABRICATION CHARACTERISTICS OF NICKEL ALLOY RENE '41.
Final rept.,
by Robert R. Wilcox. 10 Jul 62, 93p MAC A-8885
Contract AF33 657 7749

Unclassified report

Descriptors: (*Nickel alloys, Heat-resistant metals and alloys), (*Material forming, Nickel alloys), (*Welding, Nickel alloys), Chromium alloys, Cobalt alloys, Molybdenum alloys, Iron alloys, Titanium alloys, Carbon alloys, Aluminum alloys, Sheets, Mechanical properties, Tensile properties, Mechanical working.

Mechanical properties: The mechanical properties of Rene 41 correlated with the manufacturer's published data, and showed only slight directional trends; however, the mechanical properties of the .063-in. material used may be less than optimum. Formability: The .025- and .063-in. materials were satisfactorily bent with the .047- and .063-in. mandrels. Uniform elongation: Uniform elongation for both thicknesses was approximately 36% and total elongation was 38%. Dimpling: Neither sheet thickness could be satisfactorily dimpled for the 5/32 Hi-Shear or 1/4 inch (U. P.) screw. Welding: Both fusion and resistance welding characteristics of the Rene 41 alloy appeared satisfactory. Rubber forming: Rubber forming characteristics of the Rene 41 alloy indicated that completely acceptable parts of the configuration used in this test cannot be produced solely by rubber forming because of web warpage. A secondary hand-forming operation is necessary to produce acceptable .025-in. -thick parts, but requires a considerable amount of working. Hand forming is not adequate for removing the warpage in the .063-in. -thick parts.

SB-534 Div. 17, 26, 32

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
TITANIUM METALS AND ALLOYS.
Price list, selective bibliography of Government research repts. and translations for 1958-Mar 64.
1964, 59p

Unclassified report

Available free from the Clearinghouse.
Supplement to CTR-349.

Descriptors: (*Titanium, Bibliographies), (*Titanium alloys, Bibliographies), (*Bibliographies, Titanium), Processing, Machining, Welding, Brazing, Bonding, Mechanical fasteners, Corrosion, Stresses, Coatings,

Heat-resistant metals and alloys, Mechanical properties, Phase studies, Costs.

Lists 1044 domestic and foreign reports on titanium metal and alloys added to the OTS collection during the period 1958 through March 1964. Covers research on production and processing; machining; welding; brazing; bonding, rivets and fasteners; corrosion; stress corrosion; coatings; heat resistant alloys; properties; phase studies; and other miscellaneous information.

18. Military Sciences and Operations

No Entries

19. Navigation

Patent 3,160,878 Div. 19

STEERING INDICATOR FOR RANGE-BEARING NAVIGATION SYSTEM.
Navy-assigned Patent,
by Richard T. Galloway. 8 Dec 64,
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Navigational aids), (*Navigational aids, Patents), Radar equipment, Range finding, Buoys, Synchros, Circuits, Potentiometers, Amplifiers.

The system provides steering information for a helmsman following a track having a selected relation to a fixed reference point. It has special utility in the arts of mine hunting and mine sweeping. The system utilizes the ship's radar for range and bearing information with reference to a buoy. Synchroes, a servo circuit, several potentiometers, a sine-cosine resolver, a voltage comparator and two amplifiers are associated with distance and steering indicators.

20. Nuclear Physics and Nuclear Chemistry

CAPE-1106 Div. 20, 13, 30

Phillips Petroleum Co., Idaho Falls, Idaho.
NEUTRON CRYSTAL SPECTROMETER FILTER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear radiation spectrometers, Crystal filters), (*Crystal filters, Nuclear radiation spectrometers), Mechanical drawings, Glass textiles, Laminates, Epoxy plastics, Magnesium, Aluminum, Monochromatic light.

Drawings (4) are presented for a neutron filter which is a mechanical velocity selector of the Dash-Sommers type with straight slits. It is used with the MTR crystal spectrometer in low energy research. The rotor removes undesirable, higher-contaminants, thus insuring the production of a truly monochromatic Bragg beam. The rotor is constructed of magnesium and fiberglass-epoxy laminate to minimize weight. It is driven by a 1/8 hp synchronous motor. The active length of the rotor is 21 in.; the usable beam height is 2 in. Vanes of fiberglass laminate are set into 235 slots milled around the periphery of a 4 in. dia magnesium core. Eight spacer rings of magnesium are slipped over the core and a 3/16 in. winding of glass filament impregnated with epoxy is applied. The housing case is a 1/2 in. thick aluminum cylinder. The casing aligns the ends on which the axle stubs are mounted, encloses the rotor in a vacuum, and acts as a safety shield. Rotor speeds of 12,000 rpm and an operating range of 1 ev are anticipated. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

NCH-100 003 Div. 20, 25

Committee on Nuclear Science, NAS-NRC, Washington, D. C.
STUDIES IN PENETRATION OF CHARGED PARTICLES IN MATTER.
Nuclear Science Series.
1964, 388p NAS-NS-39
NAS-NRC 1133
Unclassified report

Order from National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C., 20418, as pub. 1133, $7.00.

Descriptors: (*Charged particles, Penetration), (*Elementary particles, Penetration), Ionization, Atomic orbitals, Atomic energy levels, Scattering, Protons, Atomic properties, Standards, Mesons, Electrons, Positrons, Alpha particles, Ions, Reviews, Tables.

Contents: Thomas-Fermi approach and similarity in atomic collisions, by Jens Lindhard; A critical review of experimental stopping power and range data, by H. Bichsel; On the experimental verification and determination of parameters of stopping power theory, by J. E. Turner; Contributions to the theory of shell corrections, by U. Fano and J. E. Turner; Multiple-scattering corrections for proton range measurements, by Martin J. Berger and Stephen M. Seltzer; Values of I and Iadj suggested by subcommittee, by J. E. Turner; Tables of energy losses and ranges of heavy charged particles, by W. H. Barkas and M. J. Berger; Passage of heavy ions through matter, II. Range energy curves, by L. C. Northcliffe; Energy loss straggling of protons and mesons: Tabulation of the Vavilov distribution, by S. M. Seltzer and M. J. Berger; Tables of energy losses and ranges of electrons and positrons, by M. J. Berger and S. M. Seltzer; Atomic and ionic partial stopping powers, by S. K. Allison; A list of currently unsolved problems, by U. Fano; Penetration of protons, alpha particles and mesons, by U. Fano; Passage of heavy ions through matter, by L. C. Northcliffe.

Patent 3,160,566 Div. 20, 25

PLASMA GENERATOR.
AEC-assigned Patent,
by Raphael A. Dandl and William B. Ard, Jr.
8 Dec 64 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plasma physics), (*Plasma physics, Patents), (*Microwave oscillators, Plasma physics), Magnetic fields, Gas ionization, Plasma sheath, Plasma medium, Ions, Electrons, Particle accelerators, Mass spectroscopy, Spectrum analyzers, Nuclear reactors.

The plasma may be used in accelerators mass spectrometers, reactors and other electrical devices. A method and apparatus are disclosed for producing a plasma in an evacuated enclosure permeated by a suitable magnetic field wherein the plasma is shielded from neutral gas particles by an energetic plasma blanket. This blanket is created by connecting a microwave generator to a reflecting cavity within the evacuated enclosure such that the electrons therein are heated at the electron-cyclotron frequency of the electrons. These heated electrons will, in turn, produce ions, and both ions and electrons will move along magnetic field lines to produce this plasma blanket.

Patent 3,160,567 Div. 20

SOLID STATE POWER MAPPING INSTRUMENT.
NASA-assigned Patent,
by Robert Steinberg and William B. Schwab. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor power density), (*Reactor system components, Patents), (*Reactor power density, Measuring devices (Electrical and electronic)), Radiation measurement devices, Semiconductor devices, Silicon, Coatings, Uranium.

The power survey instrument is for making tests on reactors to be used for research or power production. Detecting elements are employed comprising silicon pn junction wafers connected in series, each coated with enriched uranium-235. The detecting elements are mounted in fission probes and preferably a plurality of fission probes are employed with means for driving them automatically into space between fuel element plates. Each probe is enclosed in a probe housing.

Patent 3,160,568 Div. 20, 7, 12

NUCLEAR REACTOR.
AEC-assigned Patent,
by Donald R. MacFarlane. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Patents), (*Power supplies, Spaceborne), Nuclear power plants, Electric power production, Energy conversion, Design.

The nuclear reactor can be used as a power source in outer space. The direct conversion, conduction-cooled nuclear reactor incorporates a small, high-density, spherical core of U-233 surrounded by a beryllium reflector to which is attached a large circular, tapered fin, the core, reflector and fin being split along the midplane of the fin. The reactor is controlled by adjusting the distance between halves of the core of the reactor and thermoelectric elements disposed in the reflector convert reactor heat to electric power.

Patent 3,161,463 Div. 20

METHOD FOR PURIFICATION OF PROMETHIUM-147
AEC-assigned Patent,
by Porter B. Orr, Jr. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Promethium), (*Promethium, Patents), (*Purification, Promethium), Radioactive isotopes, Americium, Ion exchange resins.

Promethium-147 has use in X-ray sources and as an energy source for luminous dials. An eluant such as diethylene-triaminepentaacetic acid is passed through a cation exchange resin bed having promethium and americium sorbed thereon. This completely separates promethium from americium.

Patent 3,161,600 Div. 20, 26

RADIOACTIVE STRONTIUM CONTAINMENT.
AEC-assigned Patent,
by Gerald B. Barton. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Encapsulation), (*Encapsulation, Patents), (*Strontium, Encapsulation), (*Radioactive isotopes, Handling), Containment, Glass, Containers, Oxides, Phosphorous compounds, Silicon compounds, Boron compounds, Aluminum compounds, Magnesium compounds, Sodium compounds, Phosphate glass, Shielding, Nuclear industrial applications.

Strontium-90 is useful in industrial, medical and food processing irradiations. It is contained in a glass composition. The glass composition consists of 30 to 60 weight percent Sr(90)O and 33 to 65 weight percent P2O5.

Patent 3,161,601 Div. 20, 26

RADIOACTIVE CESIUM CONTAINMENT.
AEC-assigned Patent,
by Gerald B. Barton. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Encapsulation), (*Encapsulation, Patents), (*Cesium, Encapsulation), (*Radioactive isotopes, Handling), Containment, Glass, Containers, Oxides, Aluminates, Phosphate glass, Additives, Lanthanum, Zirconium, Shielding, Nuclear industrial applications.

Cesium-137 is utilized in industrial, medical and food processing irradiation, in leak and thickness testing and as a heat source for thermoelectric devices. It is incorporated in a glass containing cesium oxide, alumina and phosphate and having an additive selected such as lanthanum and zirconium.

Patent 3,161,701 Div. 20

METHOD OF MAKING NUCLEAR FUEL COMPACT.

AEC-assigned Patent,
by Dale E. Johnson and Fred H. Lofftus. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuels), (*Reactor fuels, Patents), (*Binders, Reactor fuels), Density, Refractory materials, Ceramic materials, Particles, Uranium, Refractory coatings.

The high temperature fuel bodies are ceramic in form, combining ceramic nuclear fuel with a protective refractory material. Ceramic nuclear fuel such as uranium is dispersed in discrete particle form within a matrix of a ceramic material.

21. Nuclear Propulsion

No Entries

22. Ordnance

Patent 3,160,099 Div. 22

WARHEAD PROJECTILE.
Navy-assigned Patent,
by Eugene L. Nooker. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Continuous rod warheads), (*Continuous rod warheads, Patents), (*Projectiles, Continuous rod warheads), Warheads, High-explosive ammunition, Ammunition.

The continuous rod projectile is disposed about a high explosive charge and expands or unfolds upon detonation of the warhead. The continuous rod projectiles consist of a large number of interconnected rods. A hinge joint is provided for connecting each pair of rods of a continuous rod projectile.

Patent 3,161,167 Div. 22, 9, 31

METHOD AND MEANS FOR REDUCING HYDRODYNAMIC NOISE.
Navy-assigned Patent,
by Murray H. Silverman. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydrodynamic configurations), (*Hydrodynamic configurations, Patents), (*Torpedo noise, Reduction), (*Coatings, Planing surfaces), Sand, Noise, Torpedoes, Torpedo components, Fluid flow, Underwater ordnance, Surface properties, Underwater sound, Hydrofoils.

A reduction in the hydrodynamic noise output (singing) of an underwater torpedo during operation is accomplished by roughening the trailing surface of an element that 'sings', applying a glue and then coating the surface with silica sand.

Patent 3,161,169 Div. 22

TORPEDO STEERING CONTROL UNIT.
Navy-assigned Patent,
by Edward P. Beckwith. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo components), (*Torpedo components, Patents), (*Guidance, Torpedodoes), Actuators, Marine rudders, Potentiometers, Gears, Propellers (Marine), Shafts, Underwater ordnance.

The unitary steering actuator apparatus is for rotating aligned pairs of rudder shafts of a torpedo which are disposed perpendicular to each other. The apparatus includes a frame member having a central aperture for the propeller drive shaft, a pair of segmental gears, a pair of reversible electric motors, linkage and a rotatable gear driven potentiometer carried by the frame for each of the gears for indicating the angular position of each pair of rudder shafts.

Patent 3,161,255 Div. 22, 30

UNDERWATER PLATFORM.
Navy-assigned Patent,
by Peter L. Balise, Jr. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Underwater equipment), (*Underwater equipment, Patents), Test facilities, Torpedoes, Acoustic equipment, Position finding, Analytic geometry, Supports.

The apparatus is utilized in torpedo test ranges for supporting an array of acoustic devices in a level position adjacent the floor of a body of water. It provides torpedo position data in terms of a three-dimensional cartesian system. The apparatus includes a buoyant chamber, an anchor, a rigid elongated arm between the anchor and chamber, and universal joints connecting opposite ends of the arm to the anchor and chamber.

PB-161 895 Div. 22, 5
OTS Prices: HC $1.00/MF $0.50

Human Engineering Labs., Aberdeen Proving Ground, Md.
CLOSED CIRCUIT TELEVISION VEHICLE DRIVING. I. A. PRELIMINARY INVESTIGATION.
Technical memo.,
by C. G. Moler and Gene L. Brown. Aug 60, 24p
Proj. 5W45 07 035
HEL TM10 60
Unclassified report

Descriptors: (*Television equipment, Tanks (Combat vehicles)), (*Tanks (Combat vehicles), Television equipment), Armored vehicles, Radiation hazards, Human engineering, Visual acuity, Tests, Army personnel.

A driving study was performed using television as a sole means of observation. The purpose of the study was to determine the feasibility of such a driving technique. Television affords adequate protection from radiation and has certain other advantages over the optical system presently used on Armor Vehicles. The intention of the study was to obtain indications of the problem areas using existing television equipment and to determine the need for future studies of this nature. The results were favorable in demonstrating the feasibility of driving with closed circuit television. Additional studies will be conducted. (Author)

23. Personnel and Training

PB-166 614 Div. 23, 32
OTS Prices: HC $4.00/MF $1.00

Department of Labor, Washington, D. C.
MANPOWER AND AUTOMATION RESEARCH SPONSORED BY THE OFFICE OF MANPOWER, AUTOMATION AND TRAINING, JULY 1, 1963-JUNE 30, 1964.
Nov 64, 130p

Unclassified report

Descriptors: (*Manpower studies, Research program administration), Automation, Personnel management, Labor, Education, Training, Job analysis, Professional personnel, Economics, Social sciences.

Research in the broad areas of manpower resources, requirements, development, and utilization for the purpose of developing information and methods needed to deal with the problems of unemployment is discussed. This report lists all projects within the contract research program which were active during Fiscal Year 1964. The projects are indexed by subject and contractor at the end of the report. Any research findings included are preliminary and subject to revision. Appendix I contains guidelines for preparation of research proposals by prospective contractors. It suggests that initial submissions be in the form of preliminary submissions of research ideas. Appendix II lists libraries and field offices at which completed contract research reports--marked by an asterisk (*) in this report--can be consulted.

24. Photography and Other Reproduction Processes

No Entries

25. Physics

AD-437 576 Div. 25
OTS Prices: HC $4.00/None

Technical Research Group, Melville, N. Y.
RESEARCH ON PROPERTIES OF LASER DEVICES.
Quarterly technical summary rept. no. 7, 1 Dec 63-29 Feb 64,
ed. by R. Kaplan. 29 Feb 64, 138p TRG-134-QTR-7
Contract AF49 638 673, Proj. 7300; ARPA Order256 62
N64(19)20381

Unclassified report

Descriptors: (*Lasers, Scientific research), (*Gas discharges, Lasers), (*Solid state physics, Lasers), Light, Amplifiers, Optical equipment components, Inelastic scattering, Nuclear cross sections, Gases, Nuclear energy, Pumping (Electronics), Reaction kinetics, Resonators, Optical materials, Radiation damage, Optics, Quantum mechanics.

The effort was devoted to the four major tasks of gas lasers, solid-state lasers, output control, and analytical studies, as follows: A survey of gaseous systems for collision-relaxed discharge lasers was performed and various techniques for increasing the ratio of electron-to-gas kinetic temperature were considered. The experimental implementation of a photodissociation laser was continued and the effect of turbulence and convection within the optical resonator was studied. The development of a nuclear-pumped solid-state laser was continued. The application of the Lummer-Gehrcke plate as a mode selector was studied; an experimental comparison with the distant-mirror mode selector was performed. Measurements of the damage to optical materials under laser irradiation was made. The analysis of coherent detection of diffusely reflected light was extended. In addition, immersion effect in dielectric resonators was analysed for various geometries. (Author)

NCH-100 006 Div. 25

National Bureau of Standards, Washington, D. C.
MICROWAVE SPECTRAL TABLES. VOLUME II. LINE STRENGTHS OF ASYMMETRIC ROTORS,
by Paul F. Wacker and Marlene R. Pratto.
15 Dec 64, 351p
NBS M70 V2

Unclassified report

Order from Superintendent of Documents, GPO, Washington, D. C., 20402, as C-13.44:70.V2, $3.00.

Descriptors: (*Microwave spectroscopy, Tables), Molecular spectroscopy, Quantum mechanics, Line spectrum.

Line strengths of asymmetric rotors are tabulated as a function of Ray's asymmetry parameter kappa for rotational quantum numbers J from O to 35. Procedures for interpolation as a function of kappa and extrapolation to larger J values are discussed. (Author)

NCH-100-009 Div. 25, 13

Illinois Univ., Urbana. Engineering Experiment Station.
ELASTIC PLATES: ANNOTATED BIBLIOGRAPHY 1930-1962,
by George E. Sliter, Robert J. Nikolai, and Arthur P. Boresi. Oct 64, 229p TR-10
Grants NSF G14647, NSF GP903

Unclassified report

Order from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin, v. 62, no. 25, $1.00.

Descriptors: (*Bibliographies, Structural parts), (*Structural parts, Bibliographies), Deformation,

Buckling (Mechanics), Dynamics, Elasticity, Thermal stresses, Loading (Mechanics), Mechanical properties, Abstracting, Thickness, Geometric forms.

The bibliography contains references on the equilibrium, buckling, and dynamics of elastic plates.

NCH-100 010 Div. 25, 15

Illinois Univ., Urbana. Engineering Experiment Station.
A TABULATION OF SOME SEMICONDUCTOR INTEGRALS,
by Richard M. Brown and Norman K. Hindley.
May 64, 19p C-84
Contract Nonr183412

Unclassified report

Research sponsored in part by the Coordinated Science Lab., Univ . of Illinois, Urbana, Contract DA36 039AMC02208E. Order from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin, v. 61, no. 86, $1.00.

Descriptors: (*Semiconductors, Electromagnetic properties), (*Electromagnetic properties, Integrals), (*Integrals, Tables), Integration, Numerical methods and procedures, Metals, Magnetic fields, Electric fields, Programming languages, Digital computers.

In calculations of the effect of high frequency electric fields and/or steady uniform magnetic fields on the theoretical properties of metals and semiconductors, two integrals A(p,x) and E(p,x) are of especial importance. Here x is proportional to the square of the angular frequency of the applied high frequency field or of the precessional frequency in the magnetic field. These integrals were first evaluated by Dingle and tabulated as a function of the argument x. In this circular the two integrals are evaluated to greater accuracy and tabulated versus the square root of the argument x at closer intervals than in Dingle's tables. It is felt that this tabulation will be of more convenient form for calculations involving experimental data.

26. Production and Management

CAPE-1108 Div. 26

Hanford Atomic Products Operation, Richland, Wash.
PORTABLE TUBE WELDER.
Engineering Materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Welding, Specification), (*Pipes, Welding), Stainless steel, Remote control systems, Helium group gases, Portable.

Drawings (2) are presented for a remotely controlled welder that automatically fusion welds small-diameter thin-wall stainless steel and Inconel tubing under difficult field welding conditions and on a large volume basis. It operates in an inert-gas atmosphere to prevent damage to the metal through oxidation. The tool is capable of making welds many times faster than was possible by hand methods and consistently makes welds of high quality, eliminating manual error and 100% x-ray examination. (AEC abstract)

CAPE-1129 Div. 26, 22

Los Alamos Scientific Lab., N. Mex.
SPHERICAL CONTAINMENT VESSEL.
Engineering materials.

Unclassified drawing

Price information available from OTS upon request.

Descriptors: (*Containers, Specifications), (*Explosives, Containers), Spheres, Steel, Concrete, Structural shells, Vibration isolators, Silicone plastics, Synthetic rubber.

Drawings (16) are presented for a spherical concrete vessel with an outer steel shell which was designed to serve as a container for explosives. The vessel is essentially a 16 ft OD steel sphere with a wall thickness of 1 in. which is surrounded by a 20 ft ID steel sphere 1/2 in. thick with the intermediate volume filled with concrete. In the original design, the outer steel was to be made of pentagonal segments (spherical diode cahedren segments) with flanges and gussets welded into the outer edges so that they could be assembled into a sphere by bolting flanges of adjacent segments together. This was later changed to spherical squares. Three different schemes for constructing the outer steel skin are given. One-inch spacers are inserted between the flanges. These spacers are removed after the concrete sets. A thin (1/4 in to 1/2 in.) silicone rubber layer between the concrete and inner steel acts as a shock cushion. A 7 ft door and several ports are provided for access to the vessel. (AEC Abstract)

Patent 3,161,399 Div. 26, 9

STOP VALVE MECHANISM.
Army-assigned Patent,
by Paul I. Evans. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hydraulic valves), (*Hydraulic valves, Patents), (*Cut-off valves, Fluid flow), Hydraulic fluids, Pressure, Design.

The valve mechanism controls the flow of fluids and functions as a hydraulic fuse. The valve operates automatically to interrupt the flow of a fluid in response to a decrease of the fluid pressure in its outlet circuit. The valve is located in the main path of the operating fluid and biased to a closed position. In shunt to the main path is a path which opens into the main path at the opposite sides of the valve. A piston arranged to move in this shunt path is biased to one position and is moved to another position in response to the presence of a fluid pressure at the valve inlet.

PB-166 611 Div. 26, 18
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A DYNAMIC, SINGLE-ITEM, MULTI-ECHELON INVENTORY MODEL.
Research memo.,
by A. J. Clark. 8 Dec 58, 42p RM-2297
AD 209 538

Unclassified report

Descriptors: (*Inventory control, Dynamic programming), (*Air force procurement, Inventory control), (*Dynamic programming, Inventory control), Mathematical models, Management engineering, Logistics, Operations research, Mathematical analysis.

This study describes a mathematical model constructed

as a computational aid for planners seeking to establish least cost order and supply policies within a complex and dynamic structure. It is intended only as a useful tool for research in inventory theory; there are no policy implications. This study uses a typical Air Force supply system as its frame of reference, in which many bases stock a particular item, a depot replenishes base stocks, and a factory and a repair facility resupply the depot with new and with repaired items. The main decisions to be made at any given time are how much to ship to each base, how much to repair, and how much to procure from the factory. The dyamic element in the problem is accentuated by bases phasing into and out of operation at different times, and experiencing changing failure patterns while in operation. This is, then, a dynamic, single-item, multi-echelon inventory model; that is, a model which integrates stockage policies for individual activities so as to minimize inventory costs for the logistics system as a whole.

PB-166 620 Div. 26, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A MODEL FOR THE RELIABILITY OF COMPLEX MECHANISMS,
by T. E. Harris. 5 Dec 49, 9p RM-302
AD 112 142
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Reliability, Mathematical models), (*Redundant components, Reliability), Life expectancy, Maintenance, Statistical distributions, Integral transforms.

In order to prevent the failure of a mechanism due to nonfunctioning of a crucial element, several such elements are somethimes used in parallel, any one of them being capable of performing the needed task if it is functioning. When an element goes out of commission it is restored after a certain length of time. The paper determines the Laplace transform of the distribution of the random variable L, the length of time till all the elements are simultaneously out of order, on the basis of certain assumptions about the distribution of the life-length of an individual element and the length of time required to restore an element when it is out of order. The first moment of L is determined explicitly, and further moments can be found easily. (Author)

SB-423 Suppl. 1 Div. 26, 17, 32

Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
POWDER METALLURGY.
Price list, selective bibliography of Government research repts. and translations for Sep 60-Jul 64.
1964,36p Unclassified report

Available free from the Clearinghouse.

Descriptors: (*Powder metallurgy, Bibliographies), (*Bibliographies, Powder metallurgy), Costs, Powder metals, Powder alloys, Sintering, Brazing, Mechanical working, Forging, Rolling (Metallurgy), Processing, Material forming, Composite materials, Cermets.

Lists 640 domestic and foreign references on powder metallurgy added to the OTS collection from September 1960 through July 1964. Covers research on the brazing, sintering, pressing, forging, rolling, fabricating and improved production techniques of powder metals and alloys, such as aluminum, beryllium, brass, columbium, lead, molybdenum, niobium, nickel base and cobalt base alloys, platinum, rhenium, tantalum, titanium, vanadium and refractory metals.

27. Propulsion Systems

PB-166 594 Div. 27, 31
OTS Prices: HC $6.00/MF $1.50

General Electric Co., Schenectady, N. Y.
AN INTEGRATED GAS TURBINE POWER PLANT DESIGN STUDY.
Final rept.
by R. P. Tillson. 15 May 64, 267p
Contract MA3000
Unclassified report

Prepared in cooperation with Sharp (George G.) Inc., Naval Architects, New York.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ship turbines, Gas turbines), (*Gas turbines, Ship turbines), Marine surface propulsion, Power supplies, Electric power production, Gas generating systems, Distilling plants, Generators, Propellers (Marine), Transmissions, Specifications, Design, Fuels, Atomization, Heating, Compressors.

A study was made of a 20,000-SHP, single-screw, integrated gas turbine power plant. A regenerative, two-shaft gas turbine was selected for the main power plant after studying several different gas turbine cycles. The expected all-purpose fuel rate for the ship at design conditions of 20,000 SHP, 105 prpm, 75-F inlet temperature and using specification residual fuel is 0.496 lb/SHP-hr. A mechanical drive transmission system was selected having a double-reduction gear and a controllable-and reversible-pitch propeller. An auxiliary steam system is used with steam generated by means of a heat-recovery boiler and supplemented by auxiliary hot gas generators. A gas turbine-generator set, mounted on the main deck, provides ship's standby electrical service and port electrical power requirements. This set also is arranged to utilize exhaust heat to provide heating services in port. (Author)

PB-166 595 Div. 27, 31
OTS Prices: HC $3.00/MF $0.75

General Electric Co., Schenectady, N. Y.
AXIAL FLOW REVERSING TURBINE STUDY.
SUPPLEMENT TO INTEGRATED GAS TURBINE POWER PLANT DESIGN STUDY.
Final rept., suppl,
15 Sep 64, 84p
Contract MA3000
PB 166 594 suppl.
Unclassified report

Descriptors: (*Axial-flow turbines, Feasibility studies), (*Ship turbines, Gas turbines), (*Gas turbines, Ship turbines), Marine surface propulsion, Power supplies, Electric power production, Gas generating systems, Aerodynamic configurations, Mechanical properties, Rotation, Tests, Costs, Analysis.

The main purpose of the study is to establish the feasibility of an axial flow reversing turbine. The effort was divided into two primary areas: determining the

rotation losses of the idle astern buckets when operating ahead, and developing an acceptable aerodynamic design which conforms to current mechanical and metallurgical criteria. The total losses of the astern section when operating at rated ahead conditions amount to 2.7 percent of the ahead power, with a 2 percent reduction in overall thermal efficiency of the power plant. This compares very favorably with conventional reversing means, particularly the controllable and reversible pitch propeller. The aerodynamic and mechanical design effort resulted in a compatible stage design which should have a minimum of manufacturing, assembly, operating and maintenance problems. A rough cost estimate indicates that the axial flow reversing turbine will cost lesss than one half as much as a controllable and reversible pitch (C and RP) propeller installation for a 20,000-horsepower ship. (Author)

28. Psychology and Human Engineering

PB-166 615 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
RESEARCH ON CONTEXT EFFECTS IN PSYCHOPHYSICAL JUDGMENTS.
Progress rept. for 1 Jul 57-1 Jan 60,
by William E. Kappauf. 15 Jan 60, 6p
Contract DA49 007MD877
AD 231 261
Unclassified report

Descriptors: (*Psychoacoustics, Test methods), (*Auditory perception, Psychoacoustics), Hearing, Thresholds (Physiology), Standards, Reasoning, Psychology, Auditory acuity, Psychometrics, Perception, Biophysics.

During the past year an automatic programmer was completed which has been in use since that time in conducting studies of the discrimination of auditory duration and auditory loudness. A quantitative, rational analysis of several psychophysical methods with regard to the effect which choice of step size between stimuli in the comparison series has upon the adequacy of threshold determinations was done during the past year. A series of research studies designed to determine the conditions which influence context effects were conducted. Studies during the past year included: (1) a study of bias associated with the context provided by stimuli in the traditional method of constant stimuli; (2) a multiple-standards experiment to determine the magnitude of context effects in the discrimination of auditory duration; and (3) two multiple-standards experiments on auditory loudness to explore the effects of range of stimuli, and number of standards. (Author)

PB-166 621 Div. 28
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
SOME GROUP INTERACTION MODELS.
Research memo,
by R. F. Bales, M. M. Flood, and A. S. Householder.
10 Oct 52, 67p RM-953
ATI 210 478
Rept. on Proj. RAND. Unclassified report

Descriptors: (*Mathematical models, Decision making), (*Decision making, Mathematical models), (*Monte Carlo method, Decision making), (*Group dynamics, Learning), Social communication, Emotions, Psychology, Experimental data, Game theory, Stochastic processes.

Contents:
An Interaction Model for a Decision-Making Process
The Binomial Decision-Maker
A Priority Regulator for 'The Interactor'
A Super-Ego for Members of the Interactor
A Rational Mind for Members of the Interactor
Testing Organization Theories.

29. Quartermaster Equipment and Supplies

Patent 3, 161,028 Div. 29, 31

BUOYANCY ADJUSTING DEVICE FOR SWIMMERS.
Navy-assigned Patent,
by William T. Odum, Robert H. Banks, and James E. Preston. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ballast tanks), (*Ballast tanks, Patents), (*Scuba divers, Ballast tanks), Underwater equipment, Buoyance, Swimming.

The variable ballast tank is worn by an underwater swimmer to enable him to regulate his buoyance at will. The diver's air supply is utilized to adjust the buoyancy of a ballast tank by regulating the volume of water contained in the ballast tank under control of a simple lever positioned just above hip-pocket position.

Patent 3,161,325 Div. 29

EXPULSION DEVICE.
Air Force-assigned Patent,
by Lester H. Hinkel and George Boswinkle. 15 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Food dispensing), (*Food dispensing, Patents), Life support, Containers.

The device is for expelling the contents of a food container directly into the mouth of a person in an aerospace vehicle. The expulsion device has an arrangement for severing the bottom of the container and rolling out the raw edge. The container is positioned in a housing of the device which can be held by one hand. The housing has a mouth piece. Food is expelled from the container by a piston by a rack and pawl mechanism.

Patent 3,161,846 Div. 29

HEAD MOTION SENSING SYSTEM.
Navy-assigned Patent,
by Herbert A. Wagner and Stewart C. Brown.
15 Dec 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Periscopes), (*Periscopes, Patents), Servomechanisms, Potentiometers, Head, Motion, Eye.

The apparatus produces electrical signals which are proportional to head motion. The head set is for maintaining a periscope in alignment with the eye of an observer regardless of the motions of the observers head. The apparatus includes a head band attached to a movable bar which supports a button magnet near each cheekbone. Other components of the system include two linear potentiometers, connecting linkage to gimbal systems and three rotary potentiometers associated with motion sensing arms.

Patent Design 199,678 Div. 29

INSIGNIA.
Army-assigned Patent,
by Stafford F. Potter. 1 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Labels), (*Labels, Patents), (*Armed forces (United States), Labels), Design.

A wreath forms the outer boundary of the insignia. Four swords are positioned within the wreath and a shield is superposed over a portion of each of the swords. A ribbon within the wreath is imprinted with the words JOINT CHIEFS OF STAFF.

30. Research and Research Equipment

AD-437 951 Div. 30, 8
OTS Prices: HC $4.00/None

Standford Electronics Labs., Stanford Univ., Calif.
HIGH-FREQUENCY OSCILLOGRAPHY WITH ELECTROSTATICALLY DEFLECTED INK JETS,
by Richard G. Sweet. Mar 64, 117p
SEL-64-004, SEL-TR-1722-1
Contracts DA36 039SC87300, DA36 039AMC03761E
Unclassified report

Descriptors: (*Oscillographs, High frequency), (*Recording systems, Ink), (*Ink, Jets), Drops, Aerodynamic characteristics, Drag, Electrostatics, Liquid jets, Nozzles.

The report describes a method of forming, charging, and electrostatically deflecting a high-speed jet of small, fluid droplets, and the application of this technique to a high-frequency oscillograph in which the recorded trace is written directly by a jet of ink. The oscillograph combines (1) a frequency response that exceeds that obtainable with mirror-galvanometer systems employing expensive photo-sensitive recording paper, with (2) the instant visibility, contrast, resolution, permanence, and economical operation of moving-pen or -stylus recorders. We have constructed experimental oscillographs that produce traces with amplitudes up to 2 cm peak-to-peak; this 2-cm span may be traversed in as little as 10 micro sec. The amplitude accuracy of the record is typically ±5 percent and is limited by spurious deflections of the ink droplets during flight caused by aerodynamic drag and mutual electrostatic repulsion between adjacent charged droplets.

CAPE-1053 Div. 30

Sandia Corp., Albuquerque, N. Mex.
AUTOMATIC PROGRAMMING AND RECORDING SYSTEM (APAR-3G).
Engineering materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Programming (Computers), Automatic), (*Recording systems, Computers), Data processing systems, Computer logic, Control systems, Mechanical drawings.

The APAR-3G system is an automatic programming, controlling, and recording machine which is readily adaptable to a wide variety of automated data acquisition and control system applications. It is physically and logically modular to permit the assembly of minimum or maximum capability machines by use of off-the-shelf building blocks. This system can perform the necessary acquisition and control in a typical factor environment and can generate an output (for data reduction) which is compatible with available computer systems. Drawings (9) are included. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC Abstract)

CAPE-1076 Div. 30

Sandia Corp. , Albuquerque, N. Mex.
THERMOMETER COMPARATOR/SAND-48/.
Engineering materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Thermometers, Calibration), (*Containers, Specifications), Acrylic resins, Aluminum, Thermal insulation, Test equipment.

Drawings (8) are presented for a comparator designed for liquid-in-glass thermometer calibration. The comparator is a thermally insulated 0.125 in plexiglass transparent chamber. It is 20 in. high, 7.31 in. in dia, and is attached to a Statham SD6 test chamber. The equipment is mounted on an aluminum cabinet 81/4 in high and 9 in. sq. (AEC Abstract)

CAPE-1102 Div. 30, 14, 20

Oak Ridge National Lab., Tenn.
CORROSION TEST LOOP COMPONENTS/MSRE/.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Corrosion, Test equipment), (*Reactor materials, Test equipment), (*Graphite, Compatibility), (*Fluorides, Corrosion), Centrifugal pumps, Heaters, Coolers, Drainage, Tanks (Containers), Mechanical drawings, Fuels, Lithium compounds, Beryllium compounds, Uranium compounds, Reactor fuel.

Drawings (24) are presented for the corrosion loop known as the Delta TV stand. It was used to evaluate the compatibility of graphite and INOR-8 in a dynamic fluoride fuel. The loop is a forced convection loop

operating at a maximum temperature of 1300F circulating a fluoride salt LiF-BeF2-UF4. The loop consists of a centrifugal pump, heaters, coolers, and a drain tank. The loop and pump bowl are fabricated of INOR-8 which shows negligible corrosion attack, with absence of surface pitting or subsurface void formation. The frame for the loop is 7 ft 1/2 in. high, 66 in. long, and 29 1/2 in. deep. Control instrumentation drawings are included. (AEC abstract)

NCH-100 001 Div. 30, 4, 7, 8, 13, 14, 17

Illinois Univ., Urbana. Engineering Experiment Station.
ENGINEERING DEPARTMENTAL REPORTS AND THESES, 1963: ABSTRACTS OF ENGINEERING DEPARTMENTAL REPORTS AND TITLES OF THESES OF THE UNIVERSITY OF ILLINOIS COLLEGE OF ENGINEERING,
ed. by Rima Greenberg and Michael B. Shelly.
Jul 63, 87p C-82
Unclassified report

Order from Univ. of Illinois Engineering Publications Office, Urbana, as University of Illinois Bulletin, v. 60, no. 108, no charge.

Descriptors: (*Engineering, Reports), Abstracting, Ceramic materials, Mining engineering, Agriculture, Metallurgy, Physics, Civil engineering, Petroleum industry, Digital computers, Indexes, Bibliographies, Electrical engineering, Mechanical engineering, Mechanics, Chemical engineering, Aeronautics, Astronautics.

The publication contains bibliographic data and abstracts of research reports published by departments in the University of Illinois College of Engineering during the 1962-63 fiscal year. The bibliography includes information about papers written in the following fields: electrical and mechanical engineering, agricultural engineering, ceramics, civil engineering, mining, metallurgy and petroleum engineering, physics, and computers. To facilitate acquisition of those papers that are available, an attempt has been made to include all descriptive bibliographic information currently available. Abstracts are grouped by research projects and areas of research within each department, and listed under the project title which the reports describe. These titles are alphabetized by author under the department in which they were written. All entries are referred to in both an author and subject index.

Patent 3,160,752 Div. 30, 25

REFLECTOMETER FOR MEASURING SURFACE FINISHES.
Navy-assigned Patent,
by Harold E. Bennett. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reflectometers), (*Reflectometers, Finishes and finishing), (*Finishes and finishing, Reflectometers), Optical instruments, Surface properties, Reflection, Measurement.

The optical measuring device is for measuring the surface roughness of manufactured objects such as bearings and shafts for gyroscopes, dies, plastic molds, refrigerator seals, packing rings, vacuum pump parts and memory drums for computers. The reflectance method technique is used for measuring the surface roughness.

Patent 3,160,818 Div. 30, 8

INTEGRATOR UTILIZING A BLOCKING OSCILLATOR CIRCUIT.
AEC-assigned Patent,
by James L. Engle. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Oscillators), (*Oscillators, Patents), (*Integrators (Computers), Oscillators), Analog computers, Circuits, Timing circuits, Pulse counters, Anodes (Electron tube), Diodes (Electron tube), Triodes, Transformers.

The integrator or analog computer receives input current and puts out a series of pulses to a counter, the number of pulses being proportional to the time integral of the input current. A modification of a blocking oscillator is used in which the control grid and the anode of the blocking oscillator triode are inductively interconnected by a transformer and the anode aids conduction for a short time when the control grid begins to conduct and then blocks off conduction.

Patent 3,160,819 Div. 30

'EXCLUSIVE OR' LOGICAL CIRCUIT.
Navy-assigned Patent,
by Cyrus J. Creveling. 8 Dec 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Circuits), (*Circuits, Patents), (*Computer logic, Circuits), Input-output devices, Pulse generators, Transformers, Resistors, Diodes.

The logical circuits are used in computer circuitry. The circuit includes two input terminals, two pulse generators, a transformer having a primary and secondary winding, two resistors, two diodes and an output terminal.

Patent 3,160,882 Div. 30, 6

RADAR EVALUATION APPARATUS.
Navy-assigned Patent,
by Morton Stimler, Gerald N. Plotkin, John H. Malloy, and James E. Swanekamp. 8 Dec 64,
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test sets), (*Test sets, Patents), (*Altimeters, Test sets), (*Radar equipment, Altimeters), Radar signals, Distance-measuring devices, Calibration.

The apparatus is for calibrating a radar altimeter of the type designed to generate successive series of identically time separated first and second signals at different times. Distance is simulated by effecting a variable delay of a simulated reflected signal with respect to a periodically generated initiating or synchronizing signal produced by the tested device.

Patent 3,161,047 Div. 30, 2

OMNIDIRECTIONAL ELECTROMAGNETIC FLOWMETER.
Navy-assigned Patent,
by Lyman W. Griswold. 15 Dec 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flowmeters), (*Flowmeters, Patents), Electromagnetic properties, Fluid flow, Electrical conductance, Velocity, Laminar flow, Turbulence, Cavitation, Voltage, Electrodes, Magnetic fields, Oceanographic equipment.

The flowmeter measures the speed and direction of a conducting fluid, such as for oceanographic measurements. An ellipsoidal sensing unit is employed for measuring fluid flow in two dimensions where the transition from laminar to turbulent flow takes place at a very low speed while the cavitation speed is high enough to provide a useful velocity range. Cavitation manifests itself by affecting the conductivity of the moving liquid near the electrodes used to detect the induced voltage from the magnetic field.

PB-166 599 Div. 30
OTS Prices: HC $1.25/MF $0.75

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Jan 65, 56p

Unclassified report

Also available on subscrition, $10.00 per year domestic, $13.00 per year foreign.

Descriptors: (*Naval research laboratories, Reports), (*Ultrasonic radiation, Transducers), (*Radiological contamination, Submarines), (*Naval research, Reports), Underwater, Decision making, Chemistry, Mechanics, Metallurgy, Ceramic materials, Nuclear physics, Atoms, Optics, Radio communication systems, Solid state physics, Sound.

Complete papers are presented on the following: A method for evaluating transducer loading effects on ultrasonic transit time measurements, and a survey for radioactive contamination in the vicinity of the USS Thresher. Summaries are given of research in the following fields: Applications research, chemistry, mechanics, metallurgy and ceramics, nuclear and atomic physics, optics, radio, solid state physics, and sound.

PB-166 622 Div. 30, 15
OTS Prices: HC $3.00/MF $0.75

AND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING. PART VI. THE RAND CODE FOR THE SIMPLEX METHOD (SX4) (FOR THE IBM 701 ELECTRONIC COMPUTER).
Research memo.,
by William Orchard-Hays. 7 Feb 55, 81p RM-1440
AD 86 718

Unclassified report

Rept. on Proj. RAND. See also PB-166 622.

Descriptors: (*Linear programming, Matrix algebra), (*Programming (Computers), Linear programming), Transformations (Mathematics), Vector analysis, Iterative methods, Computers, Punched cards.

The fourth in a series of codes (for the IBM 701 computer) which performs the simplex method is described. Properly speaking, it is not a code in the usual sense, but a whole coding system. Several additions, extensions, and adaptations of the basic simplex procedure have been provided for, but only the code as assembled for the revised simplex method on a primal system (as opposed to its dual) is explained in detail. To avoid confusion, the method is completely reviewed incorporating all modifications as used in the code. Appendix I contains certain 'tricks' which may be applied to many problems. Appendix II describes the operation of the preliminary data assembly routine and Appendix III describes the operation of the primal simplex code, Appendix IV gives further details of the various parts of the codes, while Appendix V illustrates the listing formats and printer board. (Author)

PB-166 644 Div. 30
OTS Prices: HC $1.00/MF $0.50

General Dynamics/Electronics, Rochester, N. Y.
BASIC PRINCIPLES OF SOME PATTERN RECOGNITION SYSTEMS,
by L. Kanal, F. Slaymaker, D. Smith and W. Walker.
1962, 18p

Unclassified report

Descriptors: (*Pattern recognition, Scientific research), (*Programming (Computers), Pattern recognition), Character recognition, Speech representation, Speech recognition, Vocabulary, Signal-to-noise ratio, Probability, Statistical analysis, Stochastic processes, Iterative methods, Theory.

The development of some devices and computer programs for pattern recognition is discussed. The basic principles used are methods of statistical inference, orthogonal expansions for time functions and joint probability functions, and some simple functional iteration procedures. In Section 1 of this paper an approach to the realization of pattern recognition devices is described. Also reported are the principles underlying the development of a character transmission-recognition system in which the composition of the characters is under the control of the designer; a multiple-font character recognition system in which the designer must accept existing character designs. Preliminary results are presented on the recognition of isolated words and vowels. In addition the problem of obtaining speech parameters for use in recognition procedures is considered. (Author)

31. Ships and Marine Equipment

Patent 3,161,380 Div. 31, 1

SLIDER FOR RETAINING AIRCRAFT LAUNCHING TOWLINES.
Navy-assigned Patent,
by James M. Crines. 15 Dec 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fastenings), (*Fastenings, Patents), (*Towing cables, Catapults), Ship decks, Launching, Aircraft, Aircraft carriers.

The aircraft catapult launching device is used on the deck of an aircraft carrier. Lanyards connect the bridle with sliders to retain the tow line or bridle on the deck after a launching. Tracks guide the sliders to permit movement along the deck but prevent it from being hurled upwardly or off the deck. Since no one towline or bridle is of satisfactory length or strength for all types of aircraft, they must be changed to suit the aircraft being launched. Furthermore, the change must be performed quickly, for instance, in fourteen seconds. The construction of the sliders and lanyards in the invention permits such an achievement.

32. Miscellaneous Arts and Sciences

AD-417 647 Div. 32
OTS Prices: HC $1.00/None

RAND Corp., Santa Monica, Calif.
THE EFFECT OF RESEARCH AND DEVELOPMENT ON THE ECONOMY,
by Richard R. Nelson. Sep 63, 14p P-2787
Unclassified report

Descriptors: (*Economics, Scientific research), Costs, Industrial production, Money, Labor, Education.

It is argued that the major effect of research and development upon the economy is to increase the capability to meet needs and aspirations which can be satisfied by goods and services. Factors taken into account include increases in labor, capital and average educational attainments.

NCH-100 007 Div. 32

Federal Council for Science and Tech., Washington, D. C.
TECHNICAL INFORMATION AND THE FEDERAL LABORATORY. PROCEEDINGS, SYMPOSIUM NO. 2, GODDARD SPACE FLIGHT CENTER, GREENBELT, MD., APRIL 13-14, 1964.
1964, 88p
Unclassified report

Order from Superintendent of Documents, GPO, Washington, D. C., 20402, as Y3.F31/16:10T22/964, $0.65.

Descriptors: (*Information retrieval, Symposia), (*Scientific research, Documentation), (*Research program administration, Scientific research), (*United States Government, Information retrieval), Reports, Abstracting, Storage, Laboratories, Scientific personnel.

To provide laboratory directors and their Washington administrators an opportunity to discuss broad technical information issues and hear reports of specific efforts made by both Government and non-Government executives. To provide laboratory directors the opportunity to propose further steps that might be taken at any level to improve technical communication in the Federal laboratory.

PB-166 587 Div. 32, 23
OTS Prices: HC $5.00/MF $1.00

RAND Corp., Santa Monica, Calif.
THE CONTROL OF INDUSTRIAL LABOR IN THE SOVIET UNION.
Research memo.,
by Jerzy G. Gliksman. 15 Feb 60, 172p RM-2494
Contract AF49 368 700
AD 235 965
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Industrial relations, USSR), (*Labor, Industrial relations), Personnel management, Wages, Employee relations, Behavior, Attitudes, Communism, Management engineering, Industrial production.

The Soviet guiding principle in setting wage rates is shown to be that of remuneration based upon output, enabling individual workers to raise their income above a bare subsistence level only by a very intense production effort. A particular type of pecuniary incentive for raising output is described. Data is presented about certain non-pecuniary incentives, such as vacations in health resorts. The over-all conclusion is that the authorities are in complete control as regards the determination of workers' incomes. Neither the labor market nor the organizational strength of the workers is allowed to influence wage levels; the attainment of higher incomes is made conditional upon the attainment of production goals set by the government and the plant managements. The picture is completed by describing instrumentalities, other than the manipulation of the workers' real income, for stimulating greater productive efforts.

PB-166 588 Div. 32, 18
OTS Prices: HC $5.00/MF $1.00

RAND Corp., Santa Monica, Calif.
COMMUNIST STRATEGY IN LAOS.
Research memo.,
by A. M. Halpern and H. B. Fredman. 14 Jun 60, 176p RM-2561
Contract AF49 368 700
AD 244 107
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from the best available copy.

Descriptors: (*Communism, Laos), (*Political science, Laos), (*Laos, Communism), (*Foreign policy, Communism), Military strategy, Warfare, Communists, Propaganda, China, Vietnam, India, United Nations, Military tactics, War potential, Evasion, Limited war, Southeast Asia.

An analysis is presented of the military actions in Laos in the summer and fall of 1959 and of their political-military background. The events are treated as a special case of limited war. Contrary to normal expectations, the initiative was on the side of the Free World. Communist actions were fully coordinated between three partners, but were reactive in nature. Both sides operated under severe restraints, which kept the action to a minimum level. The status quo at the termination of real combat was not wholly satisfactory to either side. Military action could recur in this area under varying circumstances.

PB-166 618 Div. 32, 14, 17
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
PRICES OF MISCELLANEOUS BASIC INDUSTRIAL PRODUCTS, USSR, 1928-1950,
by Lynn Turgeon, Roman Bernaut, and Abram Bergson. 9 May 55, 150p RM-1482
AD 90 549
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Industrial production, Costs), USSR, Economics, Statistical data, Tables, Refractory materials, Ores (Metal sources), Calcium compounds, Carbonates, Heaters, Iron, Pipes, Organic materials.

The study of Soviet prices for miscellaneous basic industrial products is the last of a series of studies dealing with Soviet wholesale prices during the period 1928 - 1950. The ultimate purpose of these price surveys is to provide a basis, together with production data in current ruble values, for estimating rates of change in the output of the various economic sectors of the USSR. (Author)

PB-166 624 Div. 32, 30
OTS Prices: HC $7.00/MF $1.75

Datatrol Corp., Silver Spring, Md.
EXPERIMENTAL STUDY OF CONVERTIBILITY BETWEEN LARGE TECHNICAL INDEXING VOCABULARIES.
Technical rept.,
by William Hammond and Staffan Rosenborg. Aug 62, 332p IR-1 Unclassified report
Grant NSF C259

Also includes Table of Indexing Equivalents.
See also PB-181 712 and 181 713.

Descriptors: (*Subject indexing, Vocabulary), (*Vocabulary, Subject indexing), (*Documentation, Subject indexing), Indexes, Reports, Scientific research.

A 'Table of Indexing Equivalents' is presented that was generated from an experimental study to determine the feasibility of vocabulary convertibility. Essentially, the task consisted of taking every ASTIA Descriptor and finding its identical, synonymous, or usefully equivalent counterpart in the AEC Subject Headings. Statistics showing the amount and degree of convertibility are reported. Results indicate that patterns of conversion exist such that the ultimate goal of a 'Dictionary of Indexing Equivalents' can be attained. There are several levels of convertibility. They fall generally in the categories of identity, synonymity, and generics. Difficulties in the two latter areas exist, but are not insurmountable. The assigning, for example, of a higher generic term as a useful equivalent tends to be subject to nonrigorous criteria. Knowledge of the system users' requirements, however, can provide fairly realistic solutions. Other criteria can be devised as well. Several terms were found which seemed to have no useful equivalent. For the most part, these had very low frequency of use.

PB-166 647 Div. 32
OTS Prices: HC $1.00/MF $0.50

Massachusetts Int. of Tech., Cambridge.
IN DEFENSE OF ENGLISH,
by Victor H. Yngve. 1 Jun 59, 10p
Unclassified report

A Paper Submitted to the International Conference for Standards on a Common Language for Machine Searching and Translation, Cleveland, Ohio, 6 - 12 Sep 59.

Descriptors: (*Information retrieval, Language), (*Language, Information retrieval), Classification, Indexes, Abstracting, Documentation, Textbooks, Data processing systems, Machine translation.

When a literature search is carried out with the traditional tools of classification systems, indexes, or codes of one sort or another, and when the system fails to turn up a reference, the user has no assurance that there is indeed no reference in the file. It may not be retrievable because of the inevitable loss of information in the usual abstracting, indexing, or encoding. But if one could search the entire file, this difficulty would largely disappear. The possibility of directly searching English text and the many advantages that would accrue are discussed. (Author)

PB-166 655 Div. 32
OTS Prices: HC $2.00/MF $0.50

Linguistics Research Center, Univ. of Texas, Austin.
A TEXT-ORIENTED CHINESE GRAMMAR.
Status rept.,
by Anne Oi Kan Yue. Sep 64, 47p LRC64-WDC1
Grant NSF GN208 Unclassified report

Descriptors: (*Language, China), (*Machine translation, Language), Automatic, Programming (Computers), Textbooks.

The constituents of syntactic classes are described in this first comprehensive presentation of a Chinese syntactic grammar developed at the Linguistics Research Center of The University of Texas. The grammar is of the context free phrase structure type and is designed for automatic analysis in the Linguistics Research System, a large-capacity system to support research in mechanical translation and computational linguistics. In addition to use of telecodes, expressions have been transcribed in the Pinyin system. (Author)

PB-166 656 Div. 32
OTS Prices: HC $4.00/MF $1.00

Linguistics Research Center, Univ. of Texas, Austin.
DESCRIPTION OF ENGLISH SYNTACTIC CLASSES.
Status rept.,
by M. S. Prince and K. W. Ryan. Jul 64, 128p LRC64-DE1
Grant NSF GN208
Unclassified report

Descriptors: (*Language, Analysis), (*Machine translation, Language), Programming (Computers), Automatic, Synthesis.

The constituents and environments of syntactic classes are described in this first comprehensive presentation of an English syntactic grammar developed by the Linguistics Research Center of The University of Texas. The grammar is designed for use in automatic analysis and synthesis in the Linguistics Research System (LRS), a large-capacity computer system which will support research in mechanical translation and computational linguistics. Examples of specific constituents and environments are given for each class, as well as three diagrams showing the relation of each class to the overall structure of the sentence. (Author)

PB-166 657 Div. 32, 30
OTS Prices: HC $6.00/MF $1.50

Wayne State Univ., Detroit, Mich.
COMPREHENSIVE ELECTRONIC DATA PROCESSING OF TWO RUSSIAN LEXICONS.
Interim rept.,
by H. H. Josselson. 31 Aug 64, 244p
Grant NSF GN159
Unclassified report

Descriptors: (*Dictionaries, Data processing systems), (*Language, Information retrieval), (*Programming (Computers), Language), USSR, Punched cards, Automatic, Analysis, Computer personnel.

The study analyzes and processes, for computer data retrieval, the pertinent linguistic information contained both explicitly and implicitly in two authoritative Russian lexicons. One of these is the TOLKOVYJ SLOVAR' RUSSKOGO YAZYKA, edited by D. N. Ushakov, published in Moscow in 1935, containing 85,289 entries and 5,035 cross-references. In order to insure the acquisition of up-to-date information, this dictionary is being compared with the SLOVAR' RUSSKOGO YAZYKA, published in 1957 by the Academy of Sciences of the U. S. S. R. in Moscow, which contains 82,195 entries. The work involves linguistic analysis and coding of the dictionary entries. The analysis underlying the code is performed by trained linguists and the coding scheme is designed by linguists in conjunction with computer personnel. The report describes all the lexical, morphological and syntactic information contained in both lexicons and the processing involved in organizing this information.

33. Transportation

NCH-100 004 Div. 33, 26

Maritime Cargo Transportation Conference, NAS-NRC, Washington, D. C.
SAN FRANCISCO PORT STUDY. VOLUME II. TESTS OF MODIFIED CARGO-LOADING METHODS, AND THE PORT AS A SYSTEM.
1964, 116p
NAS-NRC 1140B

Unclassified report

Order from National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C., 20418, as pub. 1140B, $12.00 per two volume set.

Descriptors: (*Shipping (Marine), Management engineering), (*Handling, Cargo), (*Cargo, Handling), (*Management engineering, Cargo), Cargo ships, Storage, Labor, Labor unions, Packaging, Personnel management, Pallets, Costs, Fork-lift vehicles, Cargo vehicles, Mathematical models, Monte Carlo method.

This volume, an account of modified work methods tested at the Naval Supply Center, Oakland, and the commercial piers in San Francisco, suggests some kinds of change that can improve stevedoring productivity with relatively minor capital outlay. Closely related to the methods tests is a discussion of the way in which stevedoring planning and control affects cargo-handling productivity. Finally, an analysis of the port system shows how changes in productivity and in labor force size affect the total system cost. It demonstrates the effects of these changes on ship turn-around time and on work-force earnings. In this work, mathematical models have been used to evaluate the relationship of ship waiting time to availability of work gangs.

PB-166 593 Div. 33, 30
OTS Prices: HC $2.00/MF $0.50

Little (Arthur D.) Inc., Cambridge, Mass.
USER MANUAL FOR THE MARAD FLEET OPERATIONS SIMULATION. VOLUME I. GENERAL DESCRIPTION.
Jan 64, 48p ALI-C-63428-23, vol. 1
Contract MA2451, Task 1

Unclassified report

See also PB-166 596, -166 597, and -166 598.

Descriptors: (*Shipping (Marine), Simulation), (*Merchant vessels, Operations research), Programming (Computers), Cargo ships.

The MarAd Fleet Operations Simulation is a tool for studying the influence of ship design characteristics, voyage itineraries and schedules, cargo availability and handling characteristics, and a host of similar elements on the operating and financial performance of a fleet of ships operating on one or more services. The purposes of this User Manual are: (1) To provide information concerning the manner in which the simulation operates, so that potential users can evaluate the applicability and potential value of employing this tool for their individual purposes. (2) To specify the preparation necessary before specific simulation runs can be made. (3) To present detailed descriptions of the simulation operation which will permit users to employ the Simulation Program effectively. These three overlapping objectives are met by providing a series of successively more detailed descriptions of the simulation, its input requirements, and its built-in logic and decision-making mechanisms. Volume I provides a general introduction to the uses and functions of simulations, and a description of the simulation in terms of what it does.

PB-166 596 Div. 33, 30
OTS Prices: HC $7.00/MF $1.75

Little (Arthur D.) Inc., Cambridge, Mass.
USER MANUAL FOR THE MARAD FLEET OPERATIONS SIMULATION. VOLUME II. DETAILED DESCRIPTION OF SIMULATION OPERATIONS.
Apr 64, 335p ALI-C-63428-23, vol. 2, ALI-C-65394-1, vol. 2
Contracts MA2451, MA3236, Task 1

Unclassified report

See also PB-166 593, PB-166 597, PB-166 598.

Descriptors: (*Shipping (Marine), Simulation), (*Merchant vessels, Operations research), Programming (Computers), Cargo ships.

The MarAd Fleet Operations Simulation is a computer program designed to carry out in the computer a series of activities which mirror or imitate the real activities of a fleet of freighters on one or more trade routes. Volume I of this User Manual, 'General Description', gives a relatively brief summary of the Simulation, the auxiliary programs, and their functions. In Volume II the information which the analyst needs in order to do his part in the study of a problem by means of the Simulation is presented. The details of the computer programs are described in full in Volume III ('Flowcharts and Documentation'). Volume II contains five chapters of which the first is the introduction. Chapter II discusses the important concepts in the Simulation: itineraries, ship schedules, sailing schedules; ports, sites, site-groups; event-times and clock-time; cargo generation; and some of the parameters or criteria that control decisions in the Simulation. Chapter III deals with the programs and their functions, and then describes and annotates the routines of the Simulation. The sources and preparation of input data are discussed in Chapter IV. Chapter V discusses outputs, their forms, and their analysis.

PB-166 597 Div. 33, 30
OTS Prices: HC $6.00/MF $1.50

Little (Arthur D.) Inc., Cambridge, Mass.
USER MANUAL FOR THE MARAD FLEET OPERATIONS SIMULATION. VOLUME III. FLOWCHARTS AND DOCUMENTATION.
Jan 64, 263p ALI-C-63428-23, vol. 3, ALI-C-65394-1, vol. 3
Contracts MA2451, MA3236, Task 1

Unclassified report

See also PB-166 596 and PB-166 598.

Descriptors: (*Shipping (Marine), Simulation), (*Merchant vessels, Operations research), Programming (Computers), Cargo ships, Magnetic core storage, Documentation, Dictionaries.

This manual contains the data format specifications, operating instructions and the program documentation for the programs which make up the MarAd Simulation Model. It is divided into two parts: (1) The Simulation Itself (Input, Rollcall, Schedule Generator, Output) and (2) The Auxiliary Programs (Edit and Extrapolator, Post-Processor, Voyage Log Sort and List, Selective

Listing). In addition, the Maritime Administration has purchased a general-purpose tabulating program called ADLTAB, which was separately documented. The reason for making this division of the volume is the major difference between the subjects. The simulation itself is a large program for the IBM 7090, written mostly in FAP. The others are much smaller, and are written in FORTRAN or AUTOCODER. The first therefore requires much more elaborate documentation in the form of flowcharts, subroutine description, lexicon, and so on.

PB-166 598 Div. 33, 30
OTS Prices: HC $3.00/MF $0.75

Little (Arthur D.) Inc., Cambridge, Mass.
USER MANUAL FOR THE MARAD FLEET OPERATIONS SIMULATION. VOLUME IV. PERFORMANCE OF THE SIMULATION, TR8.

Apr 64, 95p ALI-C-63428-23, vol. 4
Contract MA2451, Task 1

Unclassified report

See also PB-166 596, PB-166 597.

Descriptors: (*Shipping (Marine), Simulation), (*Merchant vessels, Operations Research), Programming (Computers), Cargo ships, Performance (Engineering).

The results are described of two 'Production Runs' on Trade Route 8, one intended to simulate the historical period of 1959, and the other, to test an 'Improved System' of four Warehouse Ships (20.5 knots) as designed by George G. Sharp Inc. The data are discussed in Chapter II and recorded in the appendices as printouts from the EDIT program. Results and conclusions appear in Chapter III (historical) and IV (improved system). Chapter V is devoted to a list of changes for improving the simulation programs.

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